PHOTOFACT* FOLDER SET

*TRADE MARK

NO. 77

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PHOTOFACT* Folder

*TRADE MARK

ADMIRAL CHASSIS 20A1, 20B1, 21A1, RADIO CHASSIS 4J1, 4K1

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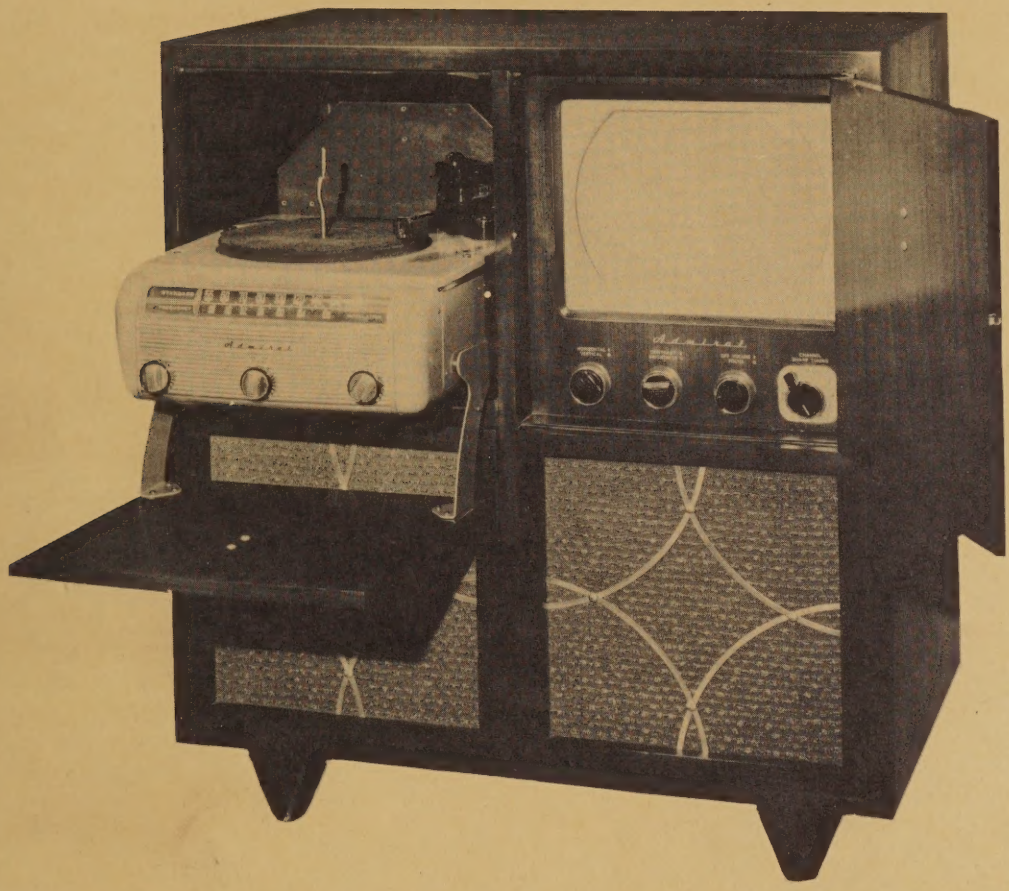

MODEL 4H145B

ADMIRAL CHASSIS
20A1, 20B1, 21A1, RADIO
CHASSIS 4J1, 4K1

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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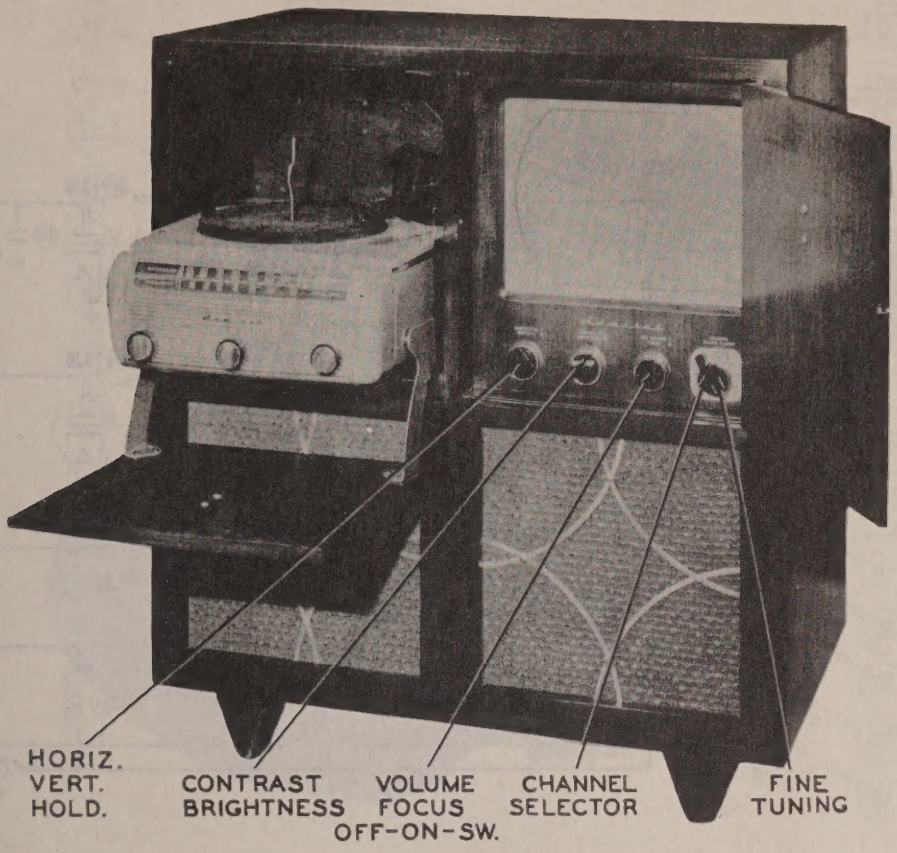
Date 11/49 Set No. 77—Folder No. 1

PHOTOFACT* Folder

ADMIRAL CHASSIS 20A1, 20B1, 21A1, RADIO CHASSIS 4J1, 4K1



ADMIRAL CHASSIS 20A1, 20B1, 21A1, RADIO CHASSIS 4J1, 4K1

TRADE NAME	Admiral, Models 4H15 A or B, 4H16 A or B, 4H17 A or B, 4H126 A,B,C, or CN, 4H137 A or B, 4H146 A or B, 4H147 A or B, 4H155 A or B, 4H156 A or B, 4H157 A or B, 4H165 A or B, 4H166 A or B, 4H167 A or B, 24A11, 24A12, 24A125, 24A126, 24A127, 24C15, 24C16, 24C17, 25A15, 25A16, 25A17, 30F15, 30F15A, 30F16, 30F16A, 30F17, 30F17A. (Chassis Models 20A1, 20B1, 21A1, and radio chassis 4J1 and 4K1).
MANUFACTURER	Admiral Corp., 3800 Cortland St., Chicago 47, Illinois
TYPE SET	FM-AM-TV-Phono Combination Receiver (Some Models TV Only).
TUBES	Thirty (Combination Receivers) Twenty Three (TV Only Receivers)
POWER SUPPLY	110-120 Volts AC, 60 Cycle
TUNING RANGE	AM 540-1620KC, FM 88-108MC, TV Channels 2 thru 13
RATING	1.9 Amp. @ 117 Volts AC

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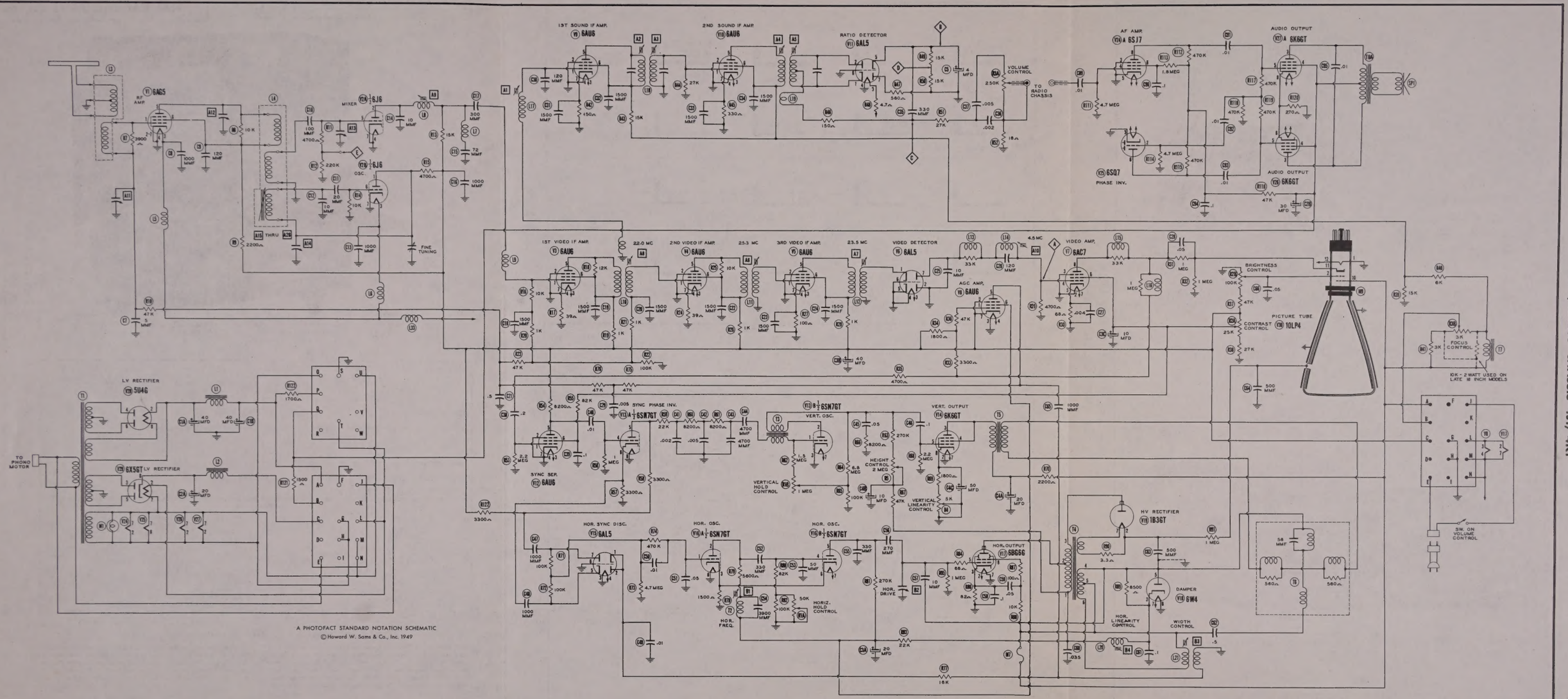
DATE 11/49 SET #77 FOLDER #1



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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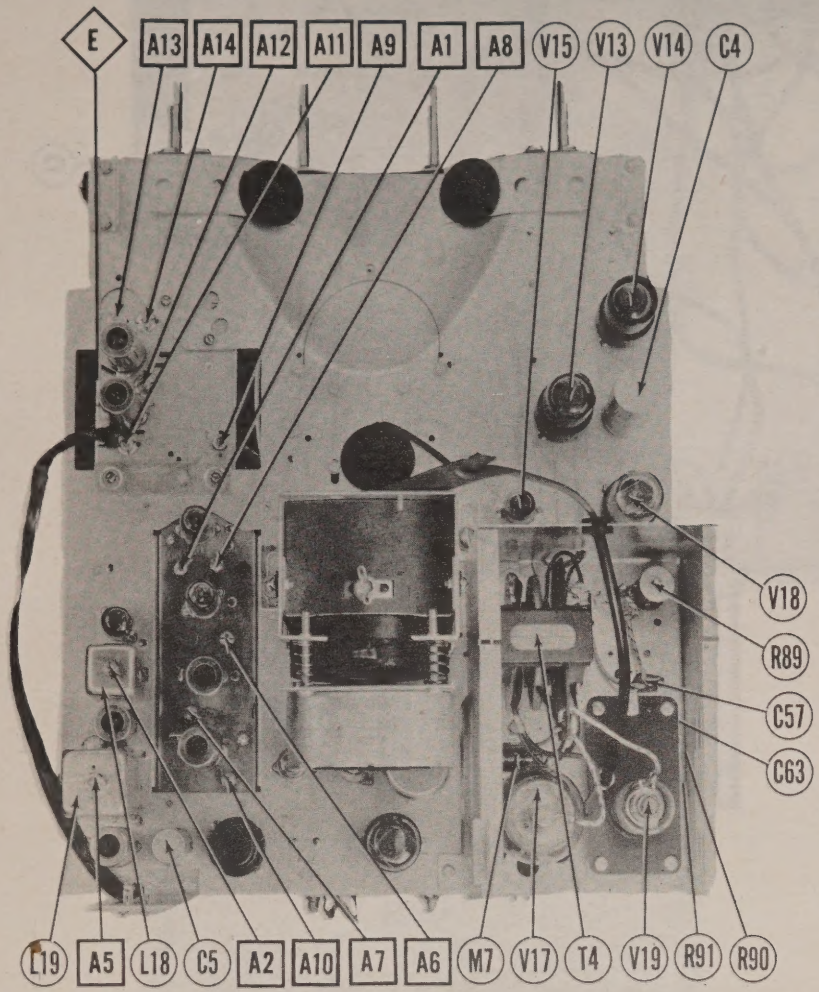
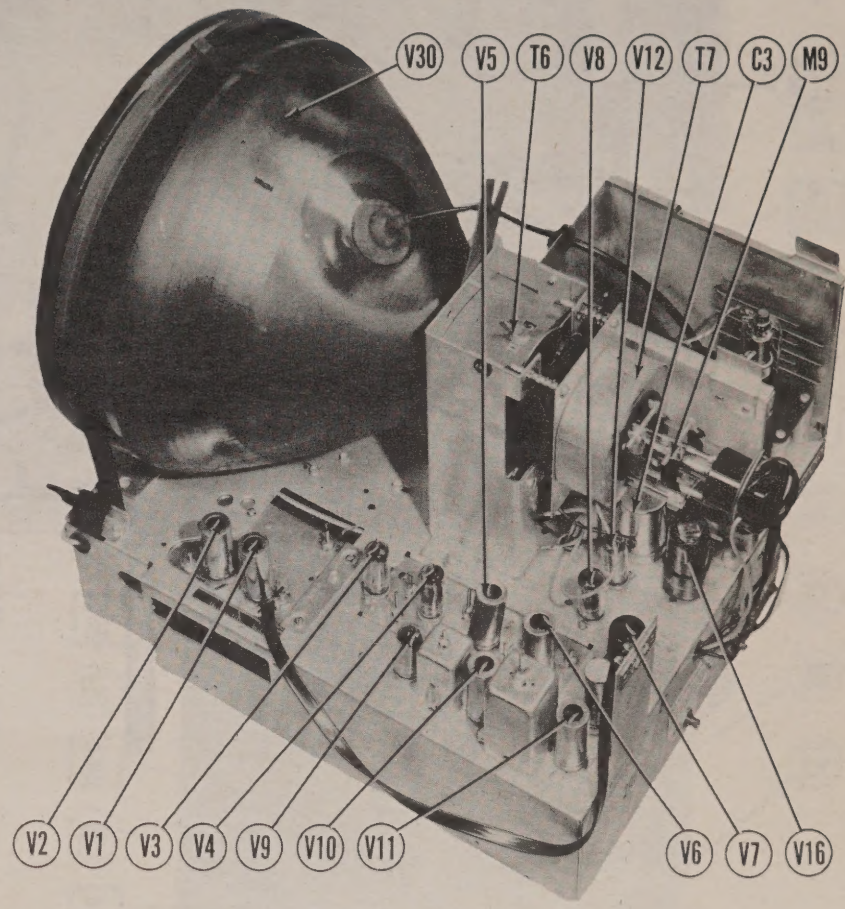
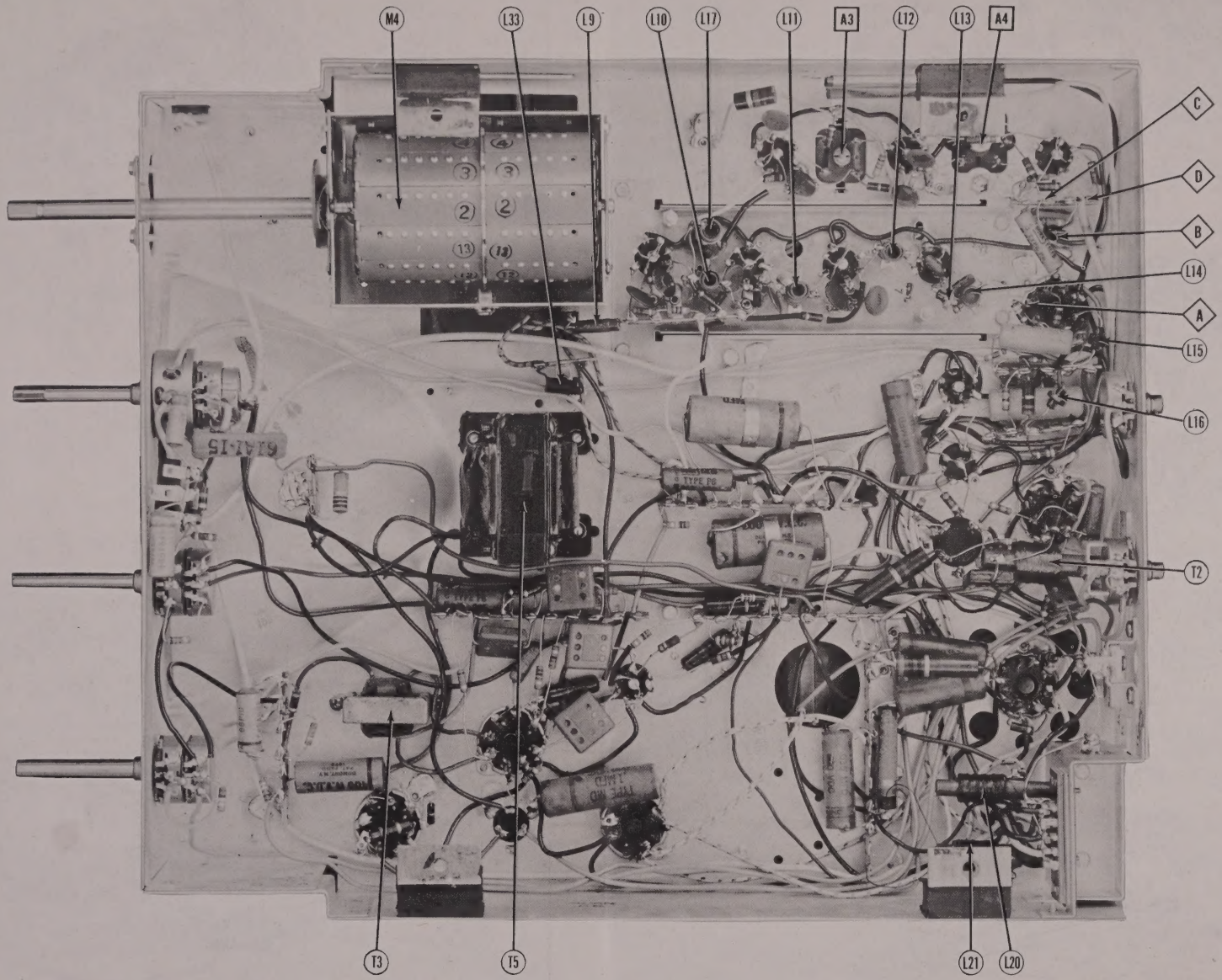




CHASSIS TOP VIEW



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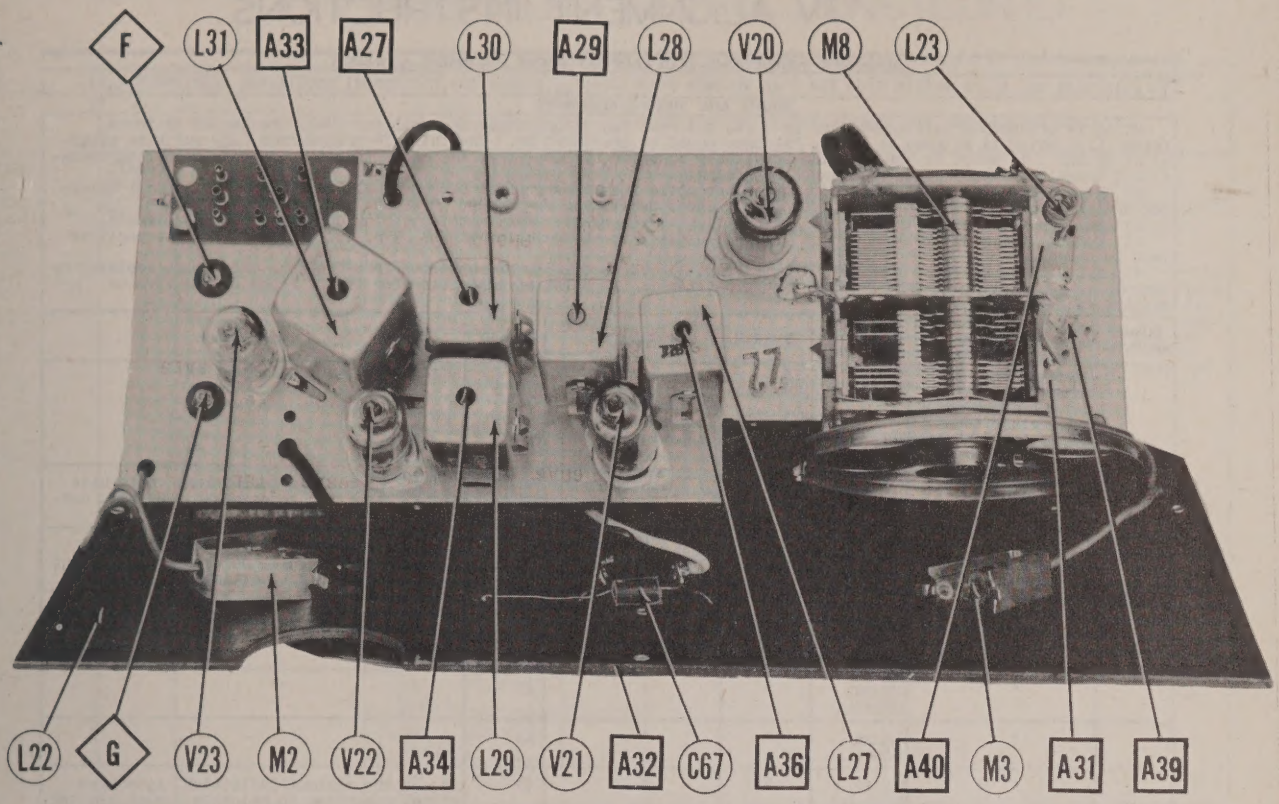
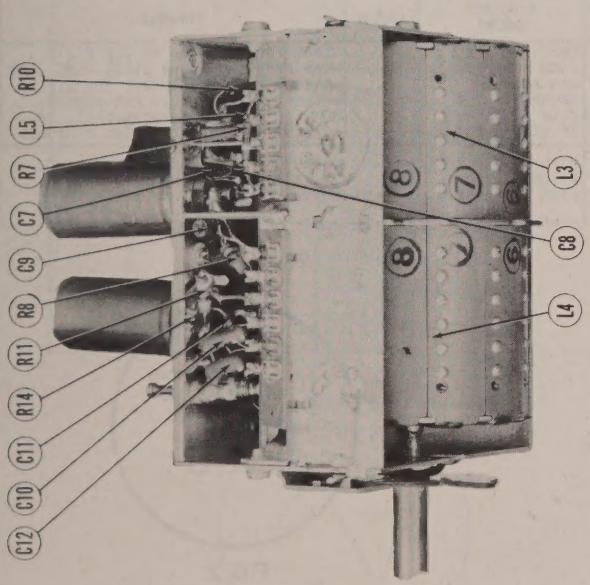
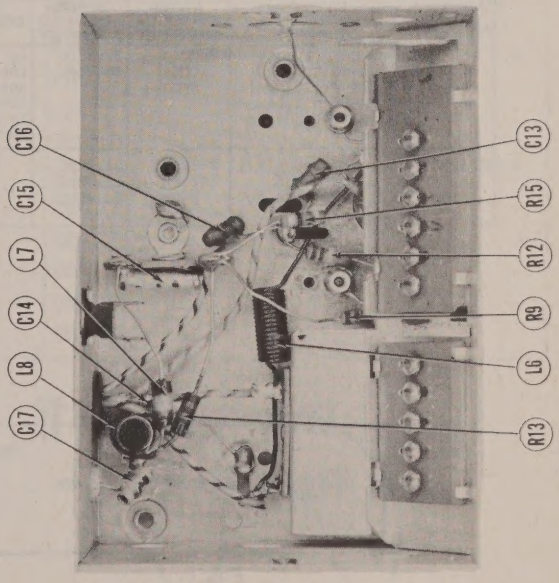


RADIO CHASSIS-TOP VIEW





RF TUNER

TV ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To eliminate the shock hazard from the high voltage power supply, remove the horizontal oscillator tube (6SN7-V16).

SOUND AND VIDEO IF ALIGNMENT

On early production sets identified by a red dot near the second video IF amplifier (V4), the second IF transformer L10, which is aligned at 22MC., has been moved to the third IF. The third IF transformer L11, which is aligned at 25.3MC., is moved to the position previously occupied by L10. That is, these transformers have been interchanged and these receivers should be aligned accordingly.

a) Remove the channel 13 oscillator and mixer coils from the turret. During IF alignment, set the channel selector switch to channel 13; this will disable the local oscillator to prevent erroneous indications.

b) Set the contrast control to the mid-position of its range. Retain this setting during all IF adjustments.

c) Connect the negative lead of a 4 1/2 volt battery to the junction of R23, R76, and C21. Connect the positive lead to chassis.

d) Connect one end of a 10KΩ resistor to Point (A). Connect a 330MMF capacitor from the free end of the resistor to chassis. The junction of this resistor and capacitor is the point of connection for the DC Probe of the VTVM or oscilloscope.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.25MC (Unmod.)	13 (See note "a" above).	DC Probe thru filter to Point (A) Common to chassis. (See note "d" above).	A1	Adjust for MINIMUM deflection.
2.		"	"	"	DC Probe to Point (B) Common to chassis.	A2,A3, A4	Adjust for maximum deflection. Attenuate signal generator to maintain 1.5 volts output.
3.		"	"	"	DC Probe to Point (C) Common to Point (D)	A5	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
4.		"	25.3MC (Unmod.)	"	DC Probe to Point (A) Common to chassis. (See note "d" above.)	A6	Adjust for maximum deflection. Attenuate signal generator to maintain 1 volt reading.
5.		"	23.5MC (Unmod.)	"	"	A7	"
6.		"	22.0MC (Unmod.)	"	"	A8	"
7.		"	22.3MC (Unmod.)	"	"	A9	Adjust for maximum deflection. Attenuate signal generator to maintain 1 volt reading. Repeat step 1. If A1 is off, readjust A1 and repeat step 6.
8.		"	4.5MC (400∿ Mod.)	"	DC Probe thru detector to pin 8 (plate) of 6AC7 (V7). Use the detector probe designed for VTVM in use, or construct one as per Fig 1.	A10	Adjust for MINIMUM deflection.

OVERALL IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC Sweep)	21.25MC 25.75MC	13 (See note "a" above IF alignment)	Vert. Amp. thru 10KΩ to Point (A) Low side to chassis. (See note "d" above IF alignment).		Check for response as per Fig 2. When checking traps at 21.25MC. use maximum marker output. The dip between peaks should not exceed 30%. If necessary retouch A1, A6, A7, A8, and A9 for proper response.
10.	500MMF	High side to pin 1 (Grid) of 6AU6 (V9). Low side to chassis.	21.25MC (450KC Sweep)	21.05MC 21.25MC 21.45MC	"	Vert. Amp. to Point (C) Low side to chassis.		Check for response as per Fig 3. If necessary retouch A2, A3, A4, and A5 for proper response.

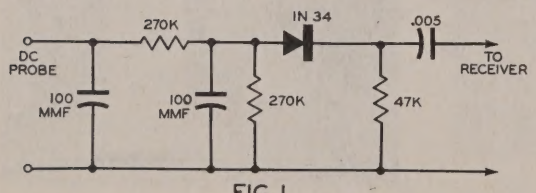


FIG. 1

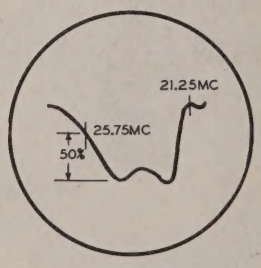


FIG. 2

TV ALIGNMENT INSTRUCTIONS (CONT.)

RF ALIGNMENT

Disconnect the 4 1/2 volt battery used during IF alignment and connect a short piece of wire from where the negative lead of the battery was removed, to chassis.
Set the contrast control to the mid-point of its range.
Connect the oscilloscope vertical amplifier input thru 10KΩ to Point (E). Connect the low side to chassis.
Replace the channel 13 oscillator and mixer coils.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
11.	Two 120Ω	Across antenna terminals with 120Ω in each lead.	207MC (10MC Sweep)	205.25MC 209.75MC	12	Vert. Amp. thru 10KΩ to Point (E) Low side to chassis.	A11, A12, A13	Adjust for response curve similar to Fig 4 with markers as shown.
12.	"	"	213MC (10MC Sweep)	211.25MC 215.75MC	13	"		Check for response similar to Fig 4. If optimum results are desired for any channel, retouch A11, A12, and A13 with channel selector set for that channel. Recheck all other channels to see that they have not been seriously effected.
			201MC (10MC Sweep)	199.25MC 203.75MC	11			
			195MC (10MC Sweep)	193.25MC 197.75MC	10			
			189MC (10MC Sweep)	187.25MC 191.75MC	9			
			183MC (10MC Sweep)	181.25MC 185.75MC	8			
			177MC (10MC Sweep)	175.25MC 179.75MC	7			
			85MC (10MC Sweep)	83.25MC 87.75MC	6			
			79MC (10MC Sweep)	77.25MC 81.75MC	5			
			69MC (10MC Sweep)	67.25MC 71.75MC	4			
			63MC (10MC Sweep)	61.25MC 65.75MC	3			
			57MC (10MC Sweep)	55.25MC 59.75MC	2			

OSCILLATOR ALIGNMENT

Overall oscillator alignment may not be necessary. If a majority of the channels are off, adjustment of A14 may correct the alignment error. A14 is an overall oscillator adjustment and should not be adjusted for individual channels.

The sound IF channel must be accurately aligned before attempting oscillator alignment. If IF alignment has not been performed, step 10 of IF response check should be performed, or steps 1, 2, and 3 of IF alignment should be performed.

Adjustments A15 thru A26 are the individual channel oscillator slugs, and are accessible thru a hole just to the right of the fine tuning and channel selector shafts. They appear as the channel selector is turned to each channel.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
13.	Two 120Ω carbon res.	Across antenna terminals with 120Ω in each lead.	215.75MC (Unmod.)	13	DC Probe to Point (C) Common to Point (D)	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
14.	"	"	209.75MC (Unmod.)	12	"	A16	"
			203.75MC (Unmod.)	11		A17	
			197.75MC (Unmod.)	10		A18	
			191.75MC (Unmod.)	9		A19	
			185.75MC (Unmod.)	8		A20	
			179.75MC (Unmod.)	7		A21	
			87.75MC (Unmod.)	6		A22	
			81.75MC (Unmod.)	5		A23	
			71.75MC (Unmod.)	4		A24	
			65.75MC (Unmod.)	3		A25	
			59.75MC (Unmod.)	2		A26	

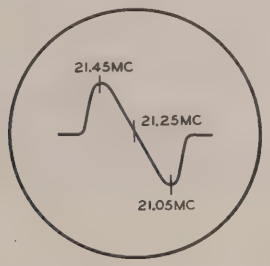


FIG. 3

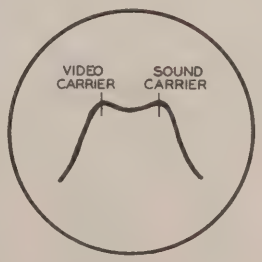


FIG. 4

RADIO ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

When complete alignment is to be performed the order outlined should be followed.
If any of the AM IF transformers, or any other part of the AM IF circuits are replaced, the FM IF alignment should be checked.
Turn the function selector switch to "Radio" and turn the tone control fully clockwise.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer turn tuning cap. fully closed and set pointer to last reference mark at low frequency end of dial.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
15	.1MFD	High side to AM antenna stator of tuning gang. Low side to chassis.	455KC (400∿ Mod.)	AM	Tuning gang fully open	Across voice coil	A27, A28, A29, A30	Adjust for maximum output.
16	.1MFD	"	1620KC (400∿ Mod.)	"	"	"	A31	Adjust for maximum output.
17		Loop	1400KC (400∿ Mod.)	"	Tune for maximum signal.	"	A32	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. Readjust A32 after set is installed in cabinet.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
18	.001MFD	High side to pin 1 (Grid) of 6BA6 (V22) Low side to chassis.	10.7MC (Unmod.)	FM	Tuning gang fully open	DC Probe to Point (F) Common to chassis.	A33	Adjust for maximum deflection. Attenuate signal generator to maintain 1.5 volt reading.
19	.001MFD	High side to pin 1 (Grid) of 6BA6 (V21). Low side to chassis.	"	"	"	"	A34, A35	"
20	Direct	Across FM ant. leads.	"	"	"	"	A36, A37	"
21	Reduce signal generator output until VTVM reads exactly 1.5 volts.							
22	Tune the signal generator above 10.7MC until VTVM reads 1 volt-Note exact frequency setting.							
23	Tune the signal generator below 10.7MC until VTVM reads 1 volt-Note exact frequency setting.							
24	Add the frequencies obtained in steps 22 and 23 and divide their sum by 2. This is the center frequency of the IF response curve.							
25	Tune the signal generator above and below 10.7MC and note VTVM readings at different frequency points until you have a good impression of the shape of the selectivity curve. If two peaks are obtained, note the readings of both peaks on VTVM. If one peak exceeds 20% of the other, realignment of the IF's is necessary.							
26	Direct	Across FM antenna terminals.	Set to mid-frequency obtained in step 24.	FM	Tuning gang fully open	DC Probe to Point (G) Common to chassis.	A38	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
18	Direct	Across FM antenna terminals.	10.7MC (450KC Sweep)	FM	Tuning gang fully open	Vert. Amp. tp Point (H) Low side to chassis.	A34, A35, A36, A37	Adjust for maximum amplitude and symmetry as per Fig 5.
19	Direct	"	"	"	"	Vert. Amp. to Point (G) Low side to chassis.	A33, A38	Adjust A38 so crossover point occurs at the center of the pattern as per Fig 6. Adjust A33 for maximum amplitude and straightness of crossover lines. Continue with step 27.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
27	Two 120Ω carbon res.	Across FM antenna leads with 120Ω in each lead.	109MC (Unmod.)	FM	Tuning gang fully open	DC Probe to Point (F) Common to chassis.	A39, A40	Adjust for maximum deflection. Attenuate signal generator to maintain 1.5 volt reading.
28	"	"	87MC (Unmod.)	"	Tune for maximum signal	"		If the signals in steps 27 and 28 do not tune near the extremes of the tuning capacitor, expand or compress turns of the oscillator coil and repeat steps 27 and 28.
29	"	"	106MC	"	"	"	A40	Readjust for maximum deflection. Check calibration at 90MC. If necessary, expand or compress antenna coil turns. Repeat steps 27, 28 and 29 if antenna coil was changed.

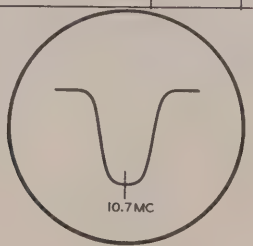


FIG. 5

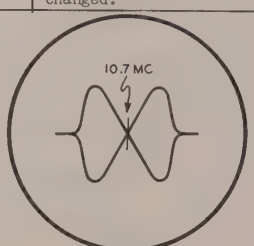
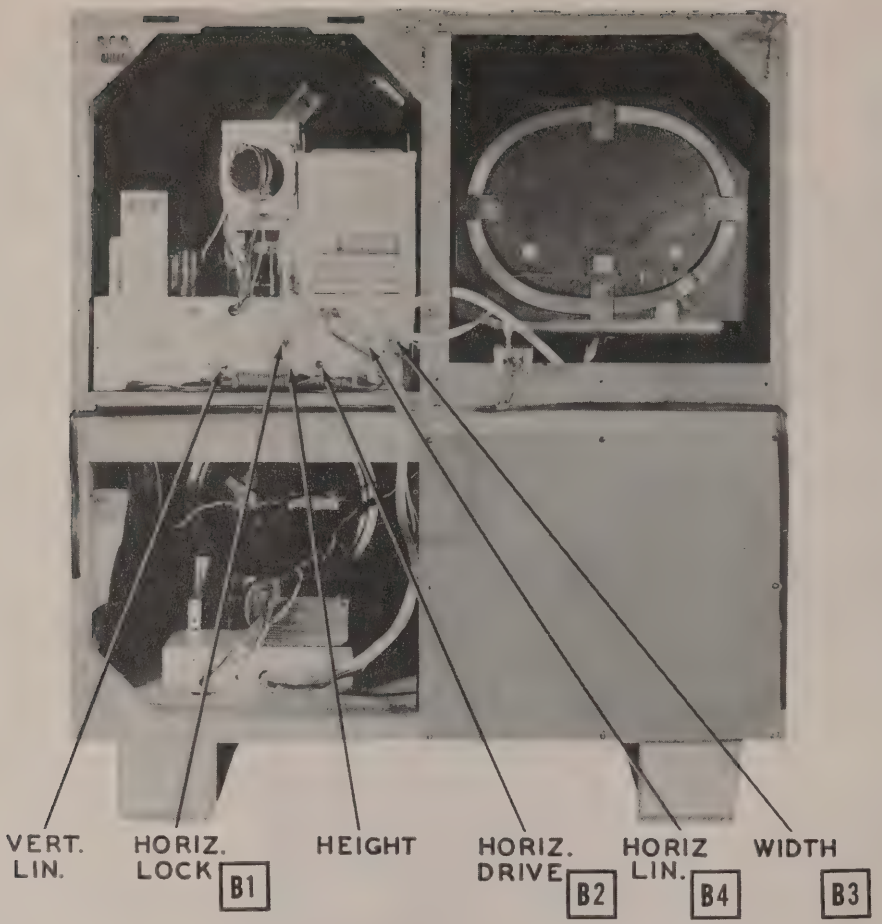


FIG. 6



CABINET-REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

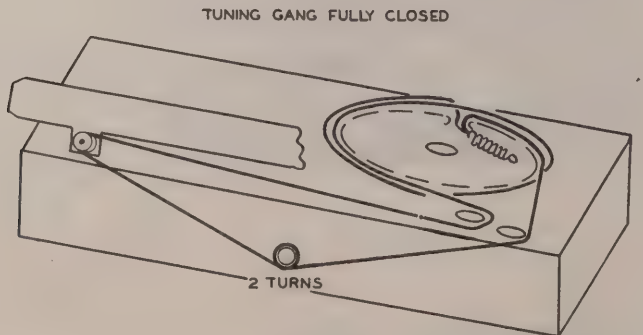
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

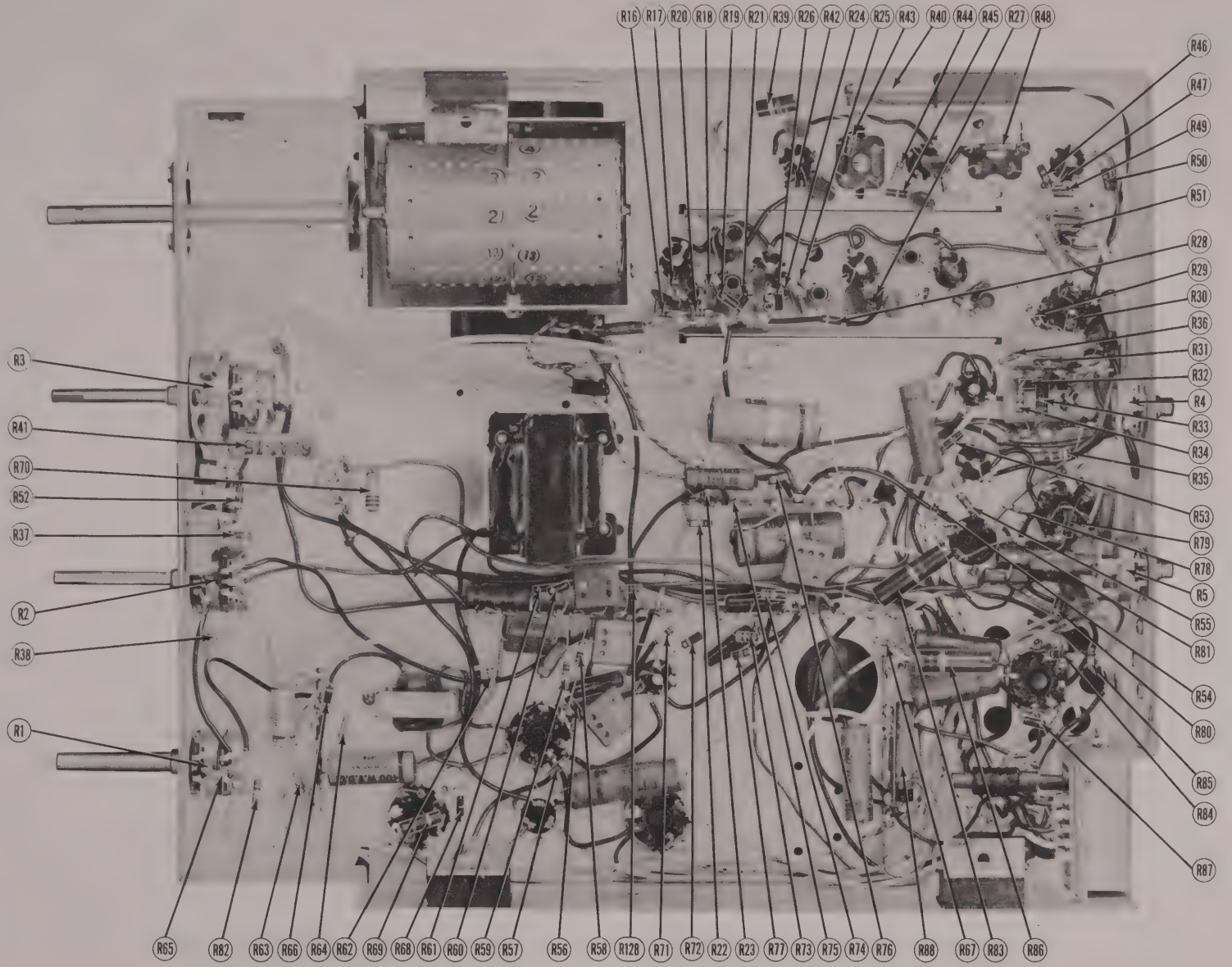
a) Turn the set on and properly tune in a TV station, (preferably a test pattern), and turn the vertical hold control to lock the picture vertically.
b) Turn the contrast and horizontal hold controls fully clockwise. If the picture is not locked in horizontally, adjust the horizontal lock adjustment (B1) until picture falls into sync.
c) Slowly turn B1 clockwise until the picture falls out of sync.
d) Slowly turn B1 counter-clockwise until the picture just falls into sync. B1 is now properly adjusted.
e) Rotate the horizontal hold control in both directions. The picture should remain in sync for approximately 3/4 of the total rotation.

HORIZONTAL LINEARITY ADJUSTMENTS

1. Adjust the horizontal driver adjustment (B2) clockwise as far as possible without severe loss of horizontal linearity.
2. Alternately adjust B2 and the horizontal linearity adjustment (B4) to obtain best horizontal linearity.
3. Adjust the width adjustment (B3) so the picture properly fills the mask horizontally. After B3 is adjusted it may be necessary to repeat step 2.

DIAL CORD STRINGING





CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		ADMIRAL PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF	6AU6	6AU6	7BK	
V4A	2nd Video IF	6AU6	6AU6	7BK	
B	2nd Video IF	6AG5	6AG5	7BD	Used in some early production models.
V5	3rd Video IF	6AU6	6AU6	7BK	
V6	Video Det.	6AL5	6AL5	6BT	
V7	Video Output	6AC7	6AC7	8N	
V8	AGC Amp.	6AU6	6AU6	7BK	
V9	1st Sound IF	6AU6	6AU6	7BK	
V10	2nd Sound IF	6AU6	6AU6	7BK	
V11	Ratio Det.	6AL5	6AL5	6BT	
V12	Sync. Sep.	6AU6	6AU6	7BK	
V13	Sync. Phase Inv.				
	Vert. Osc.	6SN7GT	6SN7GT	8BD	
V14	Vert. Output	6K6GT	6K6GT	7S	
V15	Hor. Sync. Disc.	6AL5	6AL5	6BT	
V16	Hor. Osc.	6SN7GT	6SN7GT	8BD	
V17	Hor. Output	6BG6G	6BG6G	5BT	
V18	Damper	6W4GT	6W4GT	4CG	
V19	HV Rectifier	1B3GT	1B3GT	3C	Two used in chassis 21A1 receivers.
V20	Converter	12AT7	12AT7	9A	
V21	1st IF Amp.	6BA6	6BA6	7BK	
V22	FM 2nd IF Amp.-				
	AM Det.	6BA6	6BA6	7BK	
V23	Ratio Det.	6AL5	6AL5	6BT	
V24A	AF Amp.	6SJ7	6SJ7	8N	
B	AF Amp.	6SQ7	6SQ7	8Q	"Television Only" receivers.
V25	Phase Inv.	6SQ7GT	6SQ7GT	8Q	
V26	Audio Output	6K6GT	6K6GT	7S	
V27A	Audio Output	6K6GT	6K6GT	7S	
B	Audio Output	6V6GT	6V6GT	7AC	"Television Only" receivers.
V28	LV Rectifier	5U4G	5U4G	5T	
V29	LV Rectifier	6X5GT	6X5GT	6S	
V30A	Picture Tube	10LP4	10LP4	12D	
B	Picture Tube	10BP4	10BP4	12D	
C	Picture Tube	12KP4	12KP4	12D	
D	Picture Tube	12LP4	12LP4	12D	
E	Picture Tube	12QP4	12QP4	12D	
F	Picture Tube	12TP4	12TP4	12D	
G	Picture Tube	16AP4	16AP4		Used in 21A1 chassis only.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	ADMIRAL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	450	67C 15-1	AFH88J	UP4445		TVL-64	◓ Filter
B	40	450						▲ Filter
C2A	20	350	67C 15-8	AF64H	UP3335		D10506	▲ Filter
B	30	250						■ Decoupling
C2A	30	250	67C 15-6	AF64H4A	UP6CJ		D10509	▲ Filter ♦
B	20	350			1089			■ Decoupling
C	20	25						Output Cath. Bypass
C3A	20	450	67C 15-7					◓ Decoupling
B	40	250						■ Filter
C	10	250						▲ Decoupling
C4A	20	450	67C 15-3	AFH42J8B	UP6CJ123		TVL-67	■ Vert. Output Dec.
B	10	450						▲ Vert. Osc. Dec.
C	50	50						Vert. Output Cath. Bypass
C5	4	50	67B 16-1	PRS150/4	BR550		TVA-13	Stabilizing Cap.
C6	4	150	67A 4-2	PRS150/4	BR415		UT-41	Stabilizing Cap.
C7	5		98A 45-22			NPOK-5		Fixed Trimmer
C8	1000		98A 45-24			GP2L-001		RF Fil. Bypass
C9	120		98A 45-25			GP2K-120		RF Decoupling
C10	100		98A 45-26			GP2K-120		RF Coupling
C11	20		98A 45-27			NPOK-20		Osc. Grid Cap.
C12	10		65B 6-33			N750K-10		Fixed Trimmer
C13	1000		98A 45-24			GP2L-001		Conv. Fil. Bypass
C14	10		98A 45-64			NPOK-10		Fixed Trimmer
C15	72		98A 45-65					Fixed Trimmer
C16	1000		98A 45-24			GP2L-001		RF Bypass
C17	300		98A 45-66			GP2K-300		IF Coupling
C18	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	AGC Filter
C19	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	1st V. IF Decoupling
C20	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	AGC Filter
C21	.5	200	64B 6-27	P288-5	GT2P5		TC-5	AGC Filter
C22	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	2nd V. IF Decoupling
C23	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	3rd V. IF Cath. Bypass
C24	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	3rd V. IF Decoupling
C25	10		65B 6-69	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C26	120	300	65B 1-10					Fixed Trimmer
C27	.004	600	64B 5-33	P688-004	GT6D4	GP2M-005	TM-24	V. Amp. Cath. Bypass
C28	.05	400	64B 5-22	P488-05	GT4S5		TM-15	Video Coupling
C29	.005	600	64B 5-12	P688-005	GT6D5	GP2M-005	TM-25	AGC Filter
C30	120	300	65B 1-10					Fixed Trimmer
C31	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	1st S. IF Cath. Bypass
C32	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	1st S. IF Decoupling
C33	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	2nd S. IF Cath. Byp.
C34	1500		65A 10-4	1467-0015	1W5D15	GP2L-0015	29C3	Decoupling
C35	330	500	65B 21-331	1468-0003	5W5T3	GP2K-330	1FM-335	Diode Load Cap.
C36	.002	600	64B 5-14	P688-002	GT6D2	GP2M-002	TM-22	De-emphasis
C37	.005	600	64B 5-12	P688-005	GT6D5	GP2M-005	TM-25	Audio Coupling
C38	.2	200	64B 5-29	P488-22	GT4P2		68P18	Sync. Coupling
C39	.1	200	64B 5-30	P288-1	GT2P1		TM-1	Sync. Sep. Screen Byp.
C40	.01	400	64B 5-25	P488-01	GT4S1	GP2-335-01	TM-11	Sync. Coupling
C41	.002	600	64B 5-14	P688-002	GT6D2	GP2M-002	TM-22	Integrator Net.
C42	.005	600	64B 5-12	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C43	4700	500	64B 21-472	1467-005	1D5D5	GP2M-005	1FM-25	Integrator Net.
C44	4700	500	64B 21-472	1467-005	1D5D5	GP2M-005	1FM-25	Sync. Coupling
C45	.05	400	64A 2-4	P488-05	GT4S5		TM-15	Vert. Discharge
C46	.1	400	64B 5-20	P488-1	GT4P1		TM-1	Vert. Sweep Coupling

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ADMIRAL PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C47	100	500	85B 2-[illegible]	1A[illegible]	[illegible]	[illegible]	1FM-21	Hor. Sync. Coupling
C48	100	500	85B 2-100	1W5D1	WA1-001		1FM-21	Hor. Sync. Coupling
C49	.01	400	64B 2-26	P488-01	3T4S1	8W-555-01	TM-11	AFC Feedback
C50	.01	400	64B 2-26	P488-01	3T4S1	8P2-555-01	TM-11	AFC Filter
C51	.05	200	64B 2-[illegible]	P488-05	3T2S5		TM-15	AFC Filter
C52	330	500	85B 2-331			5PCR-330		Hor. MV Feedback
C53	[illegible]	500	85B 2-[illegible]	1468-00006	5WBQ5	5P1K-50	1FM-43	Hor. MV Grid Cap. *
C54	[illegible]	500	85B 2-[illegible]					Fixed Trimmer
C55	33	500	85B 2-33			5PCR-330		Hor. Discharge ‡
C56	27	500	85B 2-27	1468-00025	5WBT25	5PCR-270	1FM-325	Hor. Sweep Coupling
C57	10	150	84A 2-[illegible]					Hor. Feedback ‡
C58	[illegible]	[illegible]	64B 2-[illegible]	P488-1	3T4P1		TM-1	Hor. Output Cath. Byp.
C59	.05	600	64B 2-[illegible]	P488-05	3T6S5		TM-15	Hor. Output Screen Byp.
C60	[illegible]	[illegible]	84A 2-[illegible]	P[illegible]				Damper Filter
C61	[illegible]	[illegible]	84A 2-[illegible]	P[illegible]				Damper Filter
C62	[illegible]	[illegible]	64B 2-[illegible]	P488-1	3T6P1		TM-1	Hor. Sweep Coupling
C63	[illegible]	[illegible]	64B 2-[illegible]	P488-5	3T2P5		TC-5	Hor. Sweep Coupling
C64	500	10000	86A 11-1					HV Filter
C65	1000	500	86A 11-102	1468-001	1W5D1	GP2L-001	1FM-21	HV Filter ‡
C66	[illegible]	[illegible]	64B 2-[illegible]	P488-05	G7485		TM-15	Hor. Sweep Feedback
C67	[illegible]	300	64B 2-[illegible]	1468-000005	5W5Y5	NP0K-5	MS-56	Brightness Cont. Byp. *
C68	[illegible]	[illegible]		1468-000005	5W5Y5	NP0K-5	MS-56	Ext. Ant. Coupling
C69	100		85B 2-[illegible]	1468-001	1W5D1	GP2L-001	1FM-21	RF Coupling
C69A	10000		86A 11-[illegible]	P488-01	G7485	821-01	36C1	RF Cath. Bypass
C70	[illegible]		85B 2-[illegible]	1468-00004	5W5Q4	GP1K-39	1FM-44	Osc. Grid Cap.
C71	[illegible]		86A 11-[illegible]					Osc. Coupling
C72	[illegible]		85B 2-[illegible]	1468-001	1W5D1	GP2L-001	1FM-21	Osc. Plate Bypass
C73	1000		86A 11-[illegible]	P488-01	G7485	821-01	36C1	Conv. Decoupling *
C74	[illegible]	300	85B 2-[illegible]	1468-00005	5W5Z5	NP0M-50	MS-45	Fixed Trimmer
C75	1000		86A 11-[illegible]	P488-01	G7485	821-01	36C1	AVC Filter
C76	1000		86A 10-[illegible]	P488-01	G7485	821-01	36C1	Decoupling *
C77	1000		86A 10-[illegible]	P488-01	G7485	821-01	36C1	RF Bypass
C78	[illegible]		85B 2-[illegible]	1468-00025	5W5Z5	[illegible]	1FM-325	Diode RF Filter
C79	[illegible]		86A 10-[illegible]	1467-005	1D5D5	811-005	2WC1	1st IF Screen Bypass
C80	[illegible]		86A 10-[illegible]	1467-005	1D5D5	811-005	2WC1	Filament Bypass
C81	5000		86A 10-[illegible]	1467-005	1D5D5	811-005	2WC1	2nd IF Screen Bypass
C82	1000		86A 10-[illegible]	P488-01	G7485	821-01	36C1	2nd IF Decoupling
C83A	10		63A 7-1	1468-0001	5W5T1	GP1K-100	1FM-21	Diode Load Cap. ♦
B	10			1468-0001	5W5T1	GP1K-100	1FM-21	Diode Load Cap. ♦
C84	100		85B 2-[illegible]	1467-001	1W5D1	GP2L-001	1FM-21	De-emphasis
C85	5000		86A 10-[illegible]	1467-005	1D5D5	811-005	2WC1	Audio Coupling
C86	120		85B 2-[illegible]	1468-001	5W5T1	GP1K-100	1FM-31	Tone Comp.
C87	1000		85B 2-[illegible]	1467-001	1W5D1	GP2L-001	1FM-21	Tone Comp.
C88	1000		85B 2-[illegible]	1467-002	1W5E2	GP2L-002	1FM-22	Tone Comp.
C89	.1	400	64B 2-26	P488-1	G7485	GP2-335-01	TM-11	Audio Coupling
C90	.1	400	64B 2-26	P488-1	G7485	GP2-335-01	TM-11	1st AF Screen Bypass
C91	.01	400	64B 2-26	P488-01	G7485	GP2-335-01	TM-11	Audio Coupling
C92	.01	400	64B 2-26	P488-01	G7485	GP2-335-01	TM-11	Audio Coupling
C93	.01	400	64B 2-26	P488-01	G7485	GP2-335-01	TM-11	Audio Coupling
C94	.1	400	64B 2-26	P488-1	G7485		TM-1	Decoupling
C95	.01	600	64B 2-24	P688-01	3T6S1		TM-11	Output Plate Bypass †
C96	.01	400	64B 2-26	P488-01	G7485	GP2-335-01	TM-11	Audio Coupling ♦
C97	.1	400	64B 2-26	P488-1	G7485		TM-1	AF Plate Decoupling ♦
C98	.01	400	64B 2-26	P488-01	G7485	GP2-335-01	TM-11	Audio Coupling ♦
C99	.01	600	64B 2-24	P688-01	3T6S1		TM-11	Output Plate Bypass ♦

* Not used in all models.
† Some models use .02MFD in this application.
‡ Chassis 20A1 uses 3500PF in this application.
§ Chassis 20A1 uses 15MMF, chassis 21A1 uses 7.5MMF in this application.
♦ Used only in power supply chassis for Television only sets.
ƒ Used only when 12" tube has no outer coating.
▲ When either Item 83A or 83B are replaced, replace both with capacitors of equal value.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	50KΩ	‡	75B 11-5			Horiz. hold control (Dual Concentric)
B	1 Meg.	‡				Vert. hold control
R2A	25KΩ	‡	75A 11-4			Contrast control (Dual Concentric)
B	100KΩ	‡				Brightness control
R3A	500Ω	‡	75B 12-3			Volume control and switch (Dual Concentric)
B	5000Ω	‡				Focus control, wire wound
R4	[illegible]	‡	75A 13-1	Q11-114	M-19-8	Vert. linearity control
R5	[illegible]	‡	75A 13-3	Q11-139	M-83-S	Height control
R6A	[illegible] Meg.	‡				Volume control
B	2 Meg.	‡	75B 11-7			Tone control (Dual Concentric)

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED
R7	3900Ω 20%	‡	98A 45-16	BTS-3900	Ant. Coil Shunt
R8	10KΩ 2%	‡	98A 45-18	BTS-10K	RF Plate Coil Shunt
R9	2200Ω 20%	‡	98A 45-19	BTS-2200	RF Decoupling
R10	47KΩ 20%	‡	98A 45-17	BTS-47K	AGC Network
R11	4700Ω	‡	98A 45-20	BTS-4700	Conv. Grid
R12	220KΩ 20%	‡	98A 45-21	BTS-220K	Conv. Grid
R13	1MΩ 20%	‡	98A 45-67	BTS-15K	Conv. Plate
R14	10KΩ	‡	98A 45-18	BTS-10K	Osc. Grid
R15	4700Ω	‡	98A 45-20	BTS-4700	Osc. Plate
R16	1KΩ	‡	60B 8-103	BTS-10K	1st Video IF Grid
R17	33Ω	‡	60B 8-350		1st Video IF Cathode
R18	12KΩ	‡	60B 8-122	BTS-12K	1st Video IF Transformer Shunt See Note 6
R19	1000Ω	‡	60B 8-102	BTS-1000	1st Video IF Decoupling
R20	100Ω	‡	60B 8-102	BTS-1000	AGC Network
R21	1000Ω	‡	60B 8-102	BTS-1000	AGC Network
R22	100KΩ	‡	60B 8-104	BTS-100K	Voltage Divider
R23	47KΩ	‡	60B 8-473	BTS-47K	AGC Network
R24	33Ω	‡	60B 8-350		2nd Video IF Cathode
R25	10KΩ	‡	60B 8-103	BTS-10K	2nd Video IF Transformer Shunt See Note 7

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	IDENTIFICATION CODES
R26	100Ω	‡	60B 8-102	BTS-1000	2nd Video IF Decoupling
R27	100Ω	‡	60B 8-101		3rd Video IF Cathode
R28	1000Ω	‡	60B 8-102	BTS-1000	3rd Video IF Decoupling
R29	4700Ω	‡	60B 8-472	BTS-4700	Video Det. Diode Load
R30	68Ω	‡	60B 8-680	BW-½-68	Video Output Cathode
R31	1 Meg.	‡	60B 8-105	BTS-1 Meg.	Voltage Divider
R32	1 Meg.	‡	60B 8-105	BTS-1 Meg.	Picture Tube Cathode
R33	3300Ω	1	60B 14-332	BTA-3300	Video Output Plate
R34	1800Ω	‡	60B 8-182	BTS-1800	Video Output Plate
R35	4700Ω	‡	60B 8-472	BTS-4700	Sync. Coupling
R36	47KΩ	‡	60B 8-473	BTS-47K	AGC Amp. Grid
R37	47KΩ	‡	60B 8-473	BTS-47K	Voltage Divider
R38	27KΩ	‡	60B 8-273	BTS-27K	Voltage Divider
R39	15KΩ	2	60B 20-153	BT-2-15K	Bleeder
R40	6000Ω	5	61A 3-11	AB-6000	Series Focus Coil (Wire Wound)
R41	3000Ω	5	61A 1-15	AB-3000	Focus Coil Shunt (Wire Wound)
R42	150Ω	‡	60B 8-151		1st Sound IF Cathode See Note 8
R43	15KΩ	‡	60B 8-153		1st Sound IF Decoupling See Note 9
R44	27KΩ	‡	60B 8-273	BTS-27K	2nd Sound IF Grid
R45	330Ω	‡	60B 8-330		2nd Sound IF Cathode
R46	150Ω	‡	60B 8-151		Balancing
R47	560Ω	‡	60B 8-561	BTS-560	Balancing See Note 1
R48	4.7Ω	‡	60B 28-11	BW-½-4.7	Ratio Det. Filament (Wire Wound)
R49	15KΩ	‡	60B 8-153	BTS-15K	Ratio Det. Diode Load
R50	15KΩ	‡	60B 8-153	BTS-15K	Ratio Det. Diode Load
R51	27KΩ	‡	60B 8-273	BTS-27K	De-emphasis
R52	18Ω	‡	60B 8-180	BW-½-18	Isolation
R53	2.2 Meg.	‡	60B 8-225	BTS-2.2 Meg.	Sync. Sep. Grid
R54	8200Ω	‡	60B 8-822	BTS-8200	Sync. Sep. Plate
R55	82KΩ	‡	60B 8-823	BTS-82K	Sync. Sep. Screen
R56	1 Meg.	‡	60B 8-105	BTS-1 Meg.	Sync. Phase Inv. Grid
R57	3300Ω	‡	60B 8-332	BTS-3300	Sync. Phase Inv. Cathode
R58	3300Ω	‡	60B 8-332	BTS-3300	Sync. Phase Inv. Plate
R59	22KΩ	‡	60B 8-223	BTS-22K	Integrator
R60	8200Ω	‡	60B 8-822	BTS-8200	Integrator
R61	8200Ω	‡	60B 8-822	BTS-8200	Integrator
R62	1.5 Meg.	‡	60B 8-155	BTS-1.5 Meg.	Vert. Osc. Grid See Note 4
R63	270KΩ	‡	60B 8-274	BTS-270K	Vert. Osc. Plate
R64	6.8 Meg.	‡	60B 8-685	BTS-6.8 Meg.	Voltage Divider
R65	100KΩ	‡	60B 8-104	BTS-100K	Voltage Divider
R66	8200Ω	‡	60B 8-822	BTS-8200	Vert. Peaking
R67	47KΩ	‡	60B 8-473	BTS-47K	Filter
R68	2.2 Meg.	‡	60B 8-225	BTS-2.2 Meg.	Vert. Output Grid
R69	1800Ω	1	60B 14-182	BTA-1800	Vert. Output Cathode
R70	2200Ω	1	60B 14-222	BTA-2200	Filter
R71	100KΩ 5%	‡	60B 7-104	BTS-100K-5%	Horiz. Sync. Disc. Load
R72	100KΩ 5%	‡	60B 7-104	BTS-100K-5%	Horiz. Sync. Disc. Load
R73	4.7 Meg.	‡	60B 8-475	BTS-4.7 Meg.	Horiz. Sync. Disc. Load
R74	470KΩ	‡	60B 8-474	BTS-470K	Horiz. AFC Filter Network
R75	47KΩ	‡	60B 8-473	BTS-47K	AGC Network
R76	47KΩ	‡	60B 8-473	BTS-47K	AGC Network
R77	18KΩ	‡	60B 8-183	BTS-18K	Feedback Network
R78	1500Ω	‡	60B 8-152	BTS-1500	Horiz. Osc. Cathode
R79	560Ω	‡	60B 8-562	BTS-5600	Horiz. Osc. Plate
R80	82KΩ	‡	60B 8-823	BTS-82K	Horiz. Osc. Grid
R81	270KΩ	‡	60B 8-274	BTS-270K	Horiz. Osc. Plate
R82	100KΩ	‡	60B 8-104	BTS-100K	Horiz. Hold Control Shunt
R83	22KΩ	2	60B 20-223	BT-2-22K	Filter
R84	68Ω	‡	60B 8-680		Parasitic Supp.
R85	1 Meg.	‡	60B 8-105	BTS-1 Meg.	Horiz. Output Grid
R86	82Ω	2	60B 20-820	BW-2-82	Horiz. Output Cathode
R87	100Ω	‡	60B 8-101		Parasitic Supp.
R88	10KΩ	2	60B 20-103	BT-2-10K	Horiz. Output Screen See Note 2
R89	8500Ω	25	61A 12-1		Damper Filter (Wire Wound) See Note 3
R90	3.3Ω	‡	60B 28-10		HV Rect. Filament
R91	1 Meg.	1	60B 28-33		HV Filter
R92	1.5 Meg.	‡	60B 8-155	BTS-1.5 Meg.	Conv. Grid
R93	390Ω	‡	60B 8-391	BW-½-390	Conv. Cathode (Wire Wound)
R94	1000Ω	‡	60B 8-102	BTS-1000	Conv. Plate
R95	22KΩ	‡	60B 8-223	BTS-22K	Osc. Grid
R96	1000Ω	‡	60B 8-102	BTS-1000	Osc. Plate Decoupling
R97	1000Ω	‡	60B 8-102	BTS-1000	Decoupling
R98	1 Meg.	‡	60B 8-105	BTS-1 Meg.	AVC Network
R99	27KΩ	1	60B 14-273	BTA-27K	1st IF Screen
R100	470KΩ	‡	60B 8-474	BTS-470K	Diode Load
R101	47KΩ	‡	60B 8-473	BTS-47K	Diode Filter
R102	27KΩ	1	60B 14-273	BTA-27K	2nd FM IF Screen
R103	1000Ω	‡	60B 8-102	BTS-1000	2nd FM IF Decoupling
R104	390Ω	‡	60B 8-391	BW-½-390	Balancing
R105	27KΩ	‡	60B 8-273	BTS-27K	De-emphasis
R106	15KΩ	‡	60B 8-153	BTS-15K	Ratio Det. Diode Load
R107	15KΩ	‡	60B 8-153	BTS-15K	Ratio Det. Diode Load
R108	100KΩ	‡	60B 8-104	BTS-100K	Tone Compensation
R109	18Ω	‡	60B 8-180	BW-½-18	Isolation
R110	22Ω	‡	60B 8-220	BW-½-22	Pilot Lamp Shunt
R111	4.7 Meg.	‡	60B 8-475	BTS-4.7 Meg.	AF Grid
R112	470KΩ	‡	60B 8-474	BTS-470K	AF Plate
R113	1.8 Meg.	‡	60B 8-185	BTS-1.8 Meg.	AF Screen
R114	4.7 Meg.	‡	60B 8-475	BTS-4.7 Meg.	Phase Inv. Grid
R115	470KΩ	‡	60B 8-474	BTS-470K	Phase Inv. Plate
R116	47KΩ	‡	60B 8-473	BTS-47K	Decoupling
R117	470KΩ	‡	60B 8-474	BTS-470K	Output Grid
R118	470KΩ	‡	60B 8-474	BTS-470K	Output Grid
R119	470KΩ	‡	60B 8-474	BTS-470K	Output Grid
R120	27Ω	2	60B 20-271	BW-2-270	Output Cathode
R121	1500Ω	5	61A 3-10	AB-1500	Filter (Wire Wound) See Note 10
R122	1700Ω	20	61A 3-9	DG-1750	Filter (Wire Wound)
R123	4.7 Meg.	‡	60B 8-475	BTS-4.7 Meg.	AF Grid See Note 5
R124	470KΩ	‡	60B 8-474	BTS-470K	AF Plate See Note 5
R125	47KΩ	‡	60B 8-473	BTS-47K	AF Plate Decoupling See Note 5
R126	470KΩ	‡	60B 8-474	BTS-470K	Output Grid See Note 5

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ADMIRAL PART No.	IRC PART No.	IDENTIFICATION CODES
R127	270Ω	2	60B 20-271	BW-2-270	Output Cathode See Note 5 and 11

Note 1. Some models use 820Ω resistor in this application.
Note 2. Models using chassis No. 20A1 use 82000Ω, 2 watt resistor in this application.
Note 3. Models using chassis No. 20A1 use 63000Ω, 50 watt resistor in this application.
Note 4. Early productions use 1 Meg. resistor in this application.
Note 5. Used only on power supply chassis for television only sets.
Note 6. Early productions used 10KΩ resistor in this application.
Note 7. Early productions used 12KΩ resistor in this application.
Note 8. Early productions used 1000Ω resistor in this application.
Note 9. Early productions used 47KΩ resistor in this application.
Note 10. Not used in chassis 21A1.
Note 11. Models using chassis 21A1 use 150Ω in this application.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA ADMIRAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ 1.9A	700VCT .20ADC 5W 4 6.3VAC @ 11.4A	320VCT .083ADC	5VAC @ 3A	80B17	P-9160		TP-450

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA ADMIRAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	51		94A17				Hor. AFC Coil
T3	162Ω	92Ω	79A18-1	A-8111	A-3000 ‡‡	T80-1 ‡‡	Vert.Block Osc.Trans.
T4A	50Ω	SEC. 1	79C23	A-8117		TP8-1	Hor.Output Trans.for
	Tap @ 162Ω	11Ω Tap @ .62					20B1 chassis.
		SEC. 2 0Ω					
B			79C19-2				Hor.Output Trans.for 20A1.
C			79C17-2				Hor.Output Trans.for 21A1 chassis.
T5	660Ω	10Ω	79B20	A-8116	A-3035 ▲▲	T80-4	Vert.Output Trans.
T6A	14Ω		94B2-2	DY-1			Hor.Deflection Coil
B	68Ω						Vert.Deflection Coil
T7	1600Ω		69B35-1				Focus Coil

▲▲ Drill new mounting holes.
‡‡ Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING DC RES. SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA ADMIRAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8A	10.5KΩ CT	3.6Ω	490Ω	.5Ω	79A16 **	A-3823	A-2936	RO-110	** Used in 6 tube power supply.
B	6000Ω	3.6Ω	280Ω	.4Ω	79A9 ††	A-3825	A-2902‡‡	RO-9	†† Used in 4 tube power supply.
									‡‡ Drill one new mounting hole.

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE 10 CURRENT 1000 ~)	REPLACEMENT DATA ADMIRAL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.200A	55Ω	2 Henries	74A12	C-2325	C-2991	TR-4200	
L2	.063A	142Ω	2.8Henries	74A17	C-2303 ▲▲	C-2574 ▲▲	R-865 ▲▲	▲▲ Drill new mounting holes.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ADMIRAL PART No.	MEISSNER PART No.	NOTES
L3	Ant. Trans. and RF Grid	0Ω		98A 58		Add channel number as suffix to part number.
L4	RF Plate Mixer Grid and Osc.	0Ω		98A 59		Add channel number as suffix to part number.
L5	Fil. Choke	0Ω		98A 45-13		
L6	Fil. Choke	0Ω		98A 45-13		
L7	RF Choke	0Ω		98A 45-68		
L8	1st Video IF	.1Ω		98A 45-69		
L9	RF Choke	.8Ω		73A 6-1		
L10	2nd Video IF and Sound Take-Off	.5Ω	.5Ω	72A 84		72A 83-1 in early production sets (See note 1)
L11	3rd Video IF	.5Ω	.5Ω	72A 84		72A 84 in early production sets (See note 1)
L12	4th Video IF	.5Ω	.5Ω	72A 83-2		
L13	Peaking	8.8Ω		73A 5-4		90 microhenries, wound on 32KΩ resistor.
L14	4.5MC Trap	1Ω		73A 4-1		7.3 microhenries.
L15	Peaking	16Ω		73A 5-1		250 microhenries, wound on 33KΩ resistor.
L16	Peaking	11Ω		73A 5-2		150 microhenries, wound on 1 Meg. resistor.
L17	1st Sound IF	.1Ω		72A 88-1		
L18	2nd Sound IF	.2Ω	.2Ω	72B 86-1		
L19	Ratio Det. Trans.	.1Ω	.1Ω	72B 87-1		

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ADMIRAL PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L20	Hor. Linearity	38Ω		72B 20		
L21	Width Cont.	80Ω	.5Ω	94A 16		
L22	AM Loop Ant.	1Ω		69C 100		Includes 2-20MMF trimmer condenser.
L23	FM Ant.	0Ω		69A 85		
L24	FM Osc.	0Ω		69A 87		
L25	AM Osc.	7.5Ω		69A 86		
L26	FM Peaking	18.5Ω		73A 5-3		Wound on 15KΩ resistor.
L27	FM 1st IF	.2Ω	.6Ω	72B 93		
L28	AM 1st IF	5.5Ω	2.5Ω	72B 92		
L29	FM 2nd IF	3Ω	0Ω	72B 76		
L30	AM 2nd IF	8.5Ω	8.5Ω	72B 94		
L31	Ratio Det.	2Ω	.2Ω	72B 39		
L32	Fil. Choke	0Ω		73A 2-4		
L33	Fil. Choke	0Ω				

Note 1. Early production sets are identified by a red dot near the 2nd Video IF Amp. (V4) on top of chassis.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA ADMIRAL PART No.	REPLACEMENT DATA JENSEN PART No.	REPLACEMENT DATA QUAM PART No.	INSTALLATION NOTES
	FIELD	V. C. IMP.		ST-120		## Replace output transformer to match 6-8Ω voice coil.
SP1A	PM	3.6Ω	78B41	MOD.P10-S##	10A6A	
B	PM		78B46			
C	PM		78B47			
D	PM		78B44-2			
E	PM		78B44-1			
	CONE DIA.	V. C. DIA.				
SP2A	9 3/4"	1"				
B	6"					
C	10"					
D	12"					
E	12"					

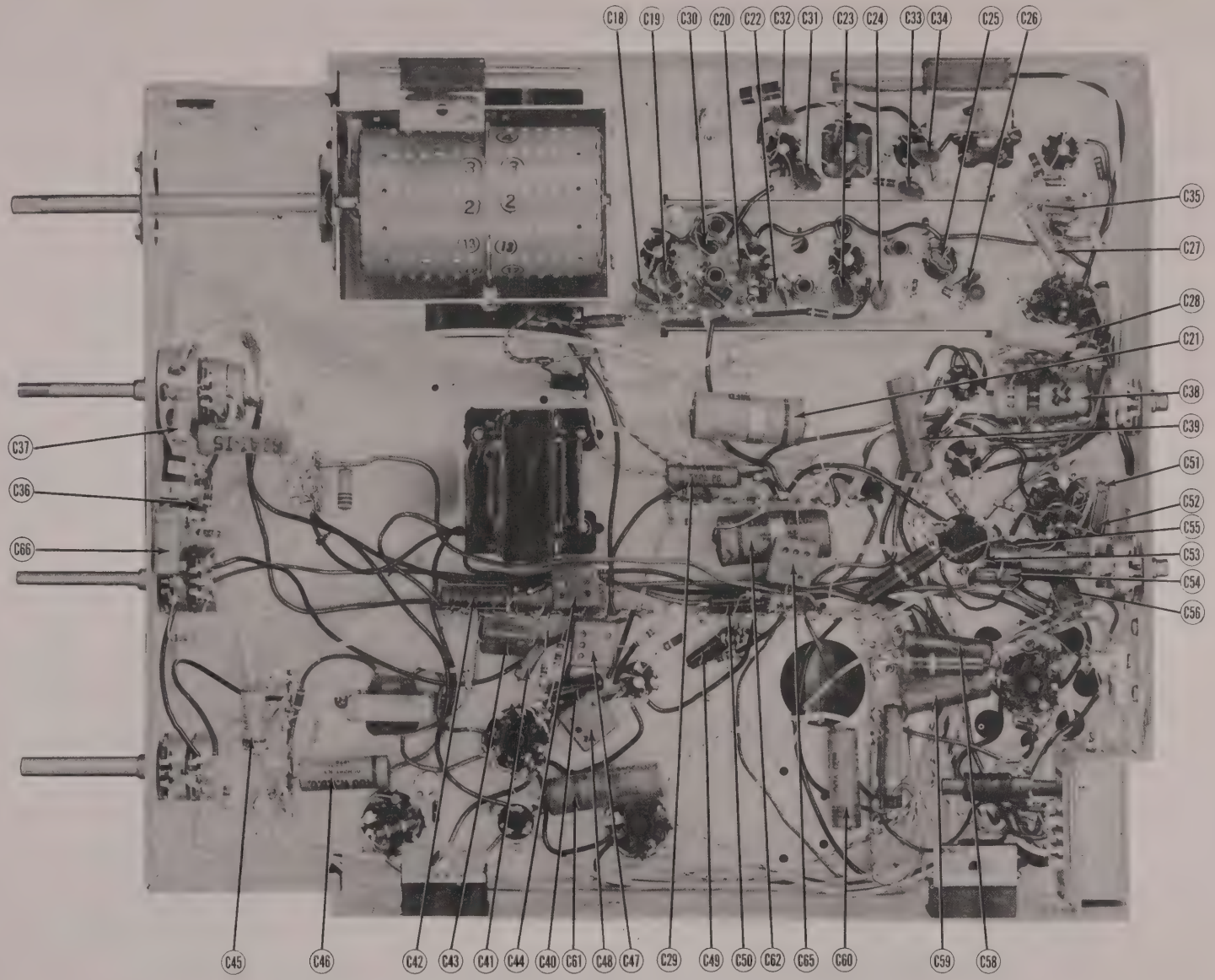
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA ADMIRAL PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	6-8	.15	Brown	81A 1-8		Type #47
M2	Bayonet	6-8	.15	Brown	81A 1-8		Type #47
M3	Bayonet	6-8	.15	Brown	81A 1-8		Type #47

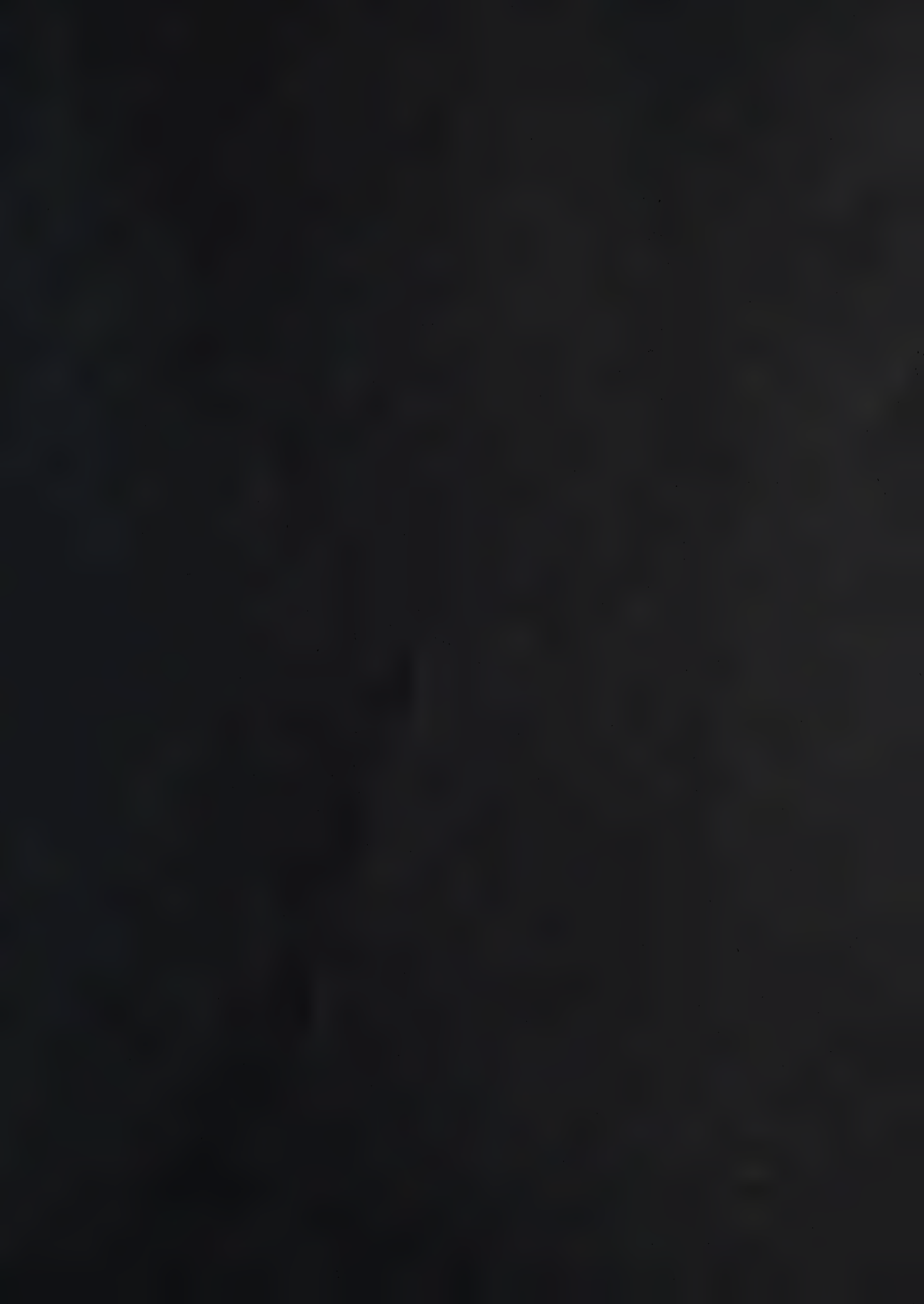
MISCELLANEOUS

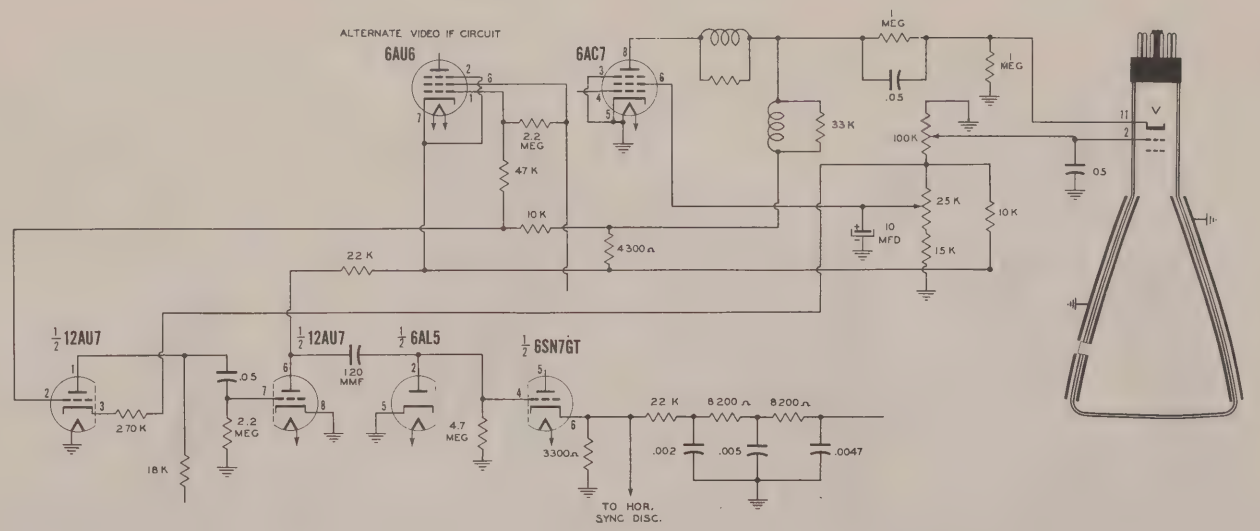
ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M4	Tuner	94C18-1	Includes turret and shaft assy. (Less coils)
M5	Switch	76B 18	AM-FM
M6	Switch	76B 19	TV-Phono-Radio
M7	Fuse	84A 4-2	Type AGX .25A
M8	Tuning Cap.	68B 24	(14-517MMF, 14-130MMF) W/T
M9A	Ion Trap	94B 6	10BP4, 12LP4 and 12TP4 Picture Tube
B	Ion Trap	94A 15-2	12QP4 Picture Tube.
	Cabinet	34E 24-1	Model 24A11 (Plastic) Ebony
	Cabinet	34E 24-2	Model 24A12 (Plastic) Mahogany
	Cabinet *	35E 93-4	Model 24C15 (Wood) Walnut
	Cabinet *	35E 93-5	Model 24C16 (Wood) Mahogany
	Cabinet *	35E 93-6	Model 24C17 (Wood) Blonde
	Cabinet *	35E 89-1	Model 4H15A or B with rectangular picture window (Walnut)
	Cabinet *	35E 89-2	Model 4H16A or B with rectangular picture window (Mahogany)
	Cabinet *	35E 89-3	Model 4H17A or B with rectangular picture window (Blonde)
	Cabinet *	35E 89-4	Model 4H15A or B with rounded-end picture window (Walnut)
	Cabinet *	35E 89-5	Model 4H16A or B with rounded-end picture window (Mahogany)
	Cabinet *	35E 89-6	Model 4H17A or B with rounded-end picture window (Blonde)
	Cabinet *	35E 98-4	Model 4H145A or B with rounded-end picture window (Walnut)
	Cabinet *	35E 98-5	Model 4H146A or B with rounded-end picture window (Mahogany)
	Cabinet *	35E 98-6	Model 4H147A or B with rounded-end picture window (Blonde)
	Cabinet *	35E 92-10	Model 4H155A or B with rounded-end picture window (Walnut)
	Cabinet *	35E 92-11	Model 4H156A or B with rounded-end picture window (Mahogany)
	Cabinet *	35E 92-12	Model 4H157A or B with rounded- end picture window (Blonde)
	Cabinet *	35E 91-5	Model 4H165A or B with rounded-end picture window (Walnut)
	Cabinet *	35E 91-6	Model 4H166A or B with rounded-end picture window (Mahogany)
	Cabinet *	35E 91-7	Model 4H167A or B with rounded-end picture window (Blonde)
	Cabinet *	35E 103-1	Model 30F15 with wood television panel (Walnut)
	Cabinet *	35E 103-2	Model 30F16 with wood television panel (Mahogany)
	Cabinet *	35E 103-3	Model 30F17 with wood television panel (Blonde)
	Cabinet *	35E 103-4	Model 30F15 with all plastic television panel (Walnut)
	Cabinet *	35E 103-5	Model 30F16 with all plastic television panel (Mahogany)
	Cabinet *	35E 103-6	Model 30F17 with all plastic television panel (Walnut)
	Plug	88A 20-1	14 pin rectangular
	Plug	88A 20-9	9 pin, power

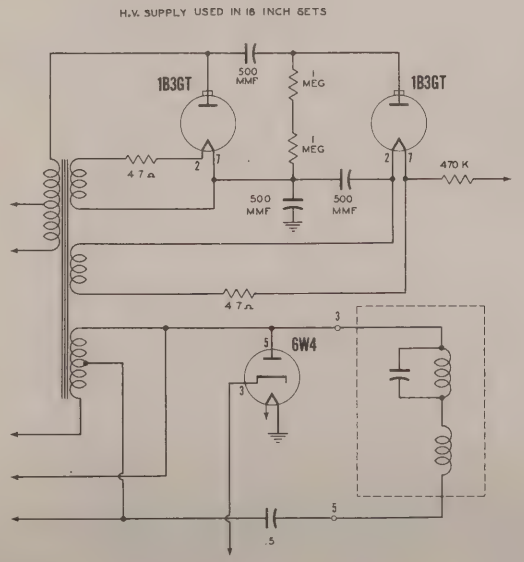
* Supplied only if old part cannot be repaired. When ordering, describe condition of old part in detail.

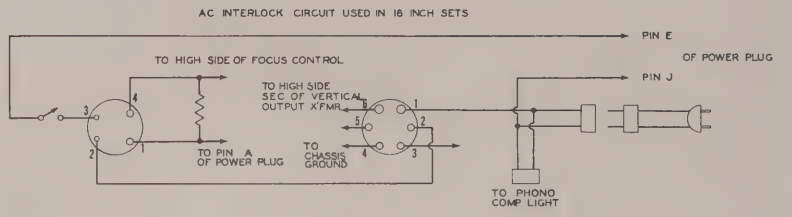


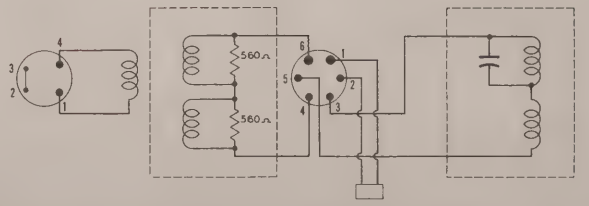
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION








AC INTERLOCK CIRCUIT USED IN 16 INCH SETS
PIN E
OF POWER PLUG
PIN J
TO HIGH SIDE OF FOCUS CONTROL
TO HIGH SIDE SEC OF VERTICAL OUTPUT X'FMR
TO PIN A OF POWER PLUG
TO CHASSIS GROUND
TO PHONO COMP LIGHT



DEFLECTION YOKE CIRCUIT USED IN 16 INCH SETS

PRODUCTION CHANGES

CHANGE TO ELIMINATE INTERFERENCE FROM HARMONICS OF THE SOUND IF STRIP IN EARLY 20A1, 20B1 21A1 CHASSIS

In early production sets, the tenth harmonic of the sound IF channel can cause interference in the form of a herringbone pattern on channel 13. (Other harmonics may cause interference on channels 3, 6 and 9.)

A check, for early production sets, to determine whether the interference is actually due to harmonics of the sound IF, is made by removing the second sound IF tube (V10) and noting if the interference pattern disappears. If the interference pattern remains, the trouble is due to some other cause.

Circuit changes (made in later production sets) to eliminate this interference are given below. Changes in early production sets to eliminate this interference can be made in the following sequence:

1. Replace the wire lead between pin 6 of V10 (6AU6) tube and R40 (6000 ohms) resistor with a 1000 ohm, 1/2 watt resistor. The resistor lead to pin 6 of V10 tube must be as short as possible.

2. Connect a 1500mmfd. min. ceramic condenser from the junction of R40 resistor and terminal of R3B focus control to the ground lug next to the socket of V10 (6AU6) tube.

3. Mount a terminal board under the mounting nut of L19 (sound IF transformer) near the video IF shield. Locate the lead between pin 7 of V7 (6AC7) tube and pin 3 of V10 (6AU6) tube, remove this lead from pin 3 of V10 (6AU6) tube and connect it to the insulated lug on the terminal board. Connect a filament RF choke from the insulated lug on the terminal board to pin 3 of V10 (6AU6) tube.

4. Locate the ground lead wired from the socket of V11 (6AL5) tube to a terminal board, clip this lead at the terminal board and solder it to the chassis near to the socket of V11 (6AL5) tube. This connection must be as short as possible.

Material Required For The Above Change

1 1000 ohm, 1/2 watt resistor....60B8-102
1 1500 mmfd. min. cer. condenser...65A10-4
1 Terminal board, 1 insulated lug...10B1-43
1 Filament RF choke.....73A2-1

CHANGE TO INCREASE TV SOUND (AUDIO) LEVEL

The changes listed below were made in later production sets to increase the TV sound (audio) level.

a. Choke coil L7 (part #98A45-68) located in TV tuner 94C18-1, has been replaced with choke coil #98A45-72. TV tuners having new coil L7 (part #98A45-72) are coded with a blue dot located on top of the tuner chassis adjacent to IF coil L8. IMPORTANT: When replacing 98A45-68 coil with 98A45-72 coil, it will also be necessary to make changes "b" and "c" below.

b. 1st video IF grid resistor R16 changed from 10,000 ohms to 4700 ohms, 1/2 watt, part #60B8-472.

c. AGC voltage divider resistor R23 changed from 47,000 ohms to 27,000 ohms, 1/2 watt, part #60B8-273.

d. 2nd sound IF transformer L18 has been changed from part #72B86-1 to part #72B86-2. IMPORTANT: When replacing 72B86-1 IF transformer with 72B86-2 IF transformer, it will also be necessary to make change "e" below.

e. Damping Resistor R44 (27,000 ohms) removed from across secondary terminals of IF transformer L18; not required with 72B86-2 IF transformer.

CHANGE IN 10" (20A1) SETS FOR INCREASED SWEEP WIDTH

The changes listed below were made in later production 20A1 (10") sets for increased sweep width without loss of horizontal linearity.

a. Horizontal damping resistor R89, has been changed from 6,300 ohms, 50 watt to 7,500 ohms, 25 watt (part #61A12-2). IMPORTANT: When replacing 6,300 ohms resistor with 7,500 ohms, 25 watt resistor (part #61A12-2) it will also be necessary to make change "b" below.

b. Cathode by-pass C58 has been changed from .1mfd., 200 volts to .2mfd., 200 volts (part #64B5-29).

CENTERING OPERATING RANGE OF FOCUS CONTROL (R212B) IN 21A1 (16") SETS.

In later 21A1 (16") sets a 10,000 ohms, 2 watt resistor (part #60B20-103) has been wired across the terminals of focus coil T7; also, one terminal of C63 (500mmfd.) is grounded instead of connecting to pin 5 of V18. See schematic.

This change was made in order to shift the operating point of focus control R3B reasonably close to the center point of rotation.

CENTERING OPERATING POINT OF VERTICAL HOLD CONTROL (R1B)

Grid resistor R62 of V13B (6SN7GT) vertical oscillator is generally 1.2 meg., 1/2 watt, (part #60B8-125). However, when vertical hold control R1B will not operate reasonably close to the center of its range, resistance value of R62 may be 1 meg., 1/2 watt (part #60B8-105) or 1.5 meg., 1/2 watt (part #60B8-155).

R41 WATTAGE RATING INCREASE IN 16" (21A1) SETS

In early 21A1 (16") sets, R41 focus coil shunt resistor was 3000 ohms, 5 watts. In later 21A1 (16") sets R41 was changed to 3000 ohms, 7.5 watts (61A1-16). This change was made to allow for greater heat disipation under certain operating conditions.

DISASSEMBLY INSTRUCTIONS

1. Remove four push-on type knobs from TV controls.
2. Remove 6 screws holding metal cover over rear of TV compartment.
3. Remove 7 screws holding fiber cover over rear of phono compartment.
4. Remove one 1/4" hex head bolt holding clamp over plug on right rear of TV chassis.
5. Remove one 1/4" hex head bolt holding ground strap to right rear corner of TV chassis.
6. Remove plug from right rear of TV chassis.
7. Remove TV audio bayonet plug from socket in lead connecting TV chassis to AM-FM chassis.
8. Remove three 7/16" hex head bolts holding TV chassis to cabinet.
9. Remove TV chassis.
10. Remove plug from left rear of power supply chassis.
11. Remove phono motor power plug under record changer and feed wires back to power supply chassis.
12. Remove AM-FM chassis audio plug from front left corner of power supply chassis.
13. Remove panel lamp from bottom front center of cabinet.
14. Remove four screws holding power supply chassis to cabinet and slide chassis approximately four inches to rear.
15. Remove four 11/32" hex nuts holding speaker to cabinet.
16. Remove speaker and power supply chassis together. (If so desired, speaker wires may be unsoldered at speaker enabling speaker and power supply chassis to be removed separately.)
17. Remove 3 push-on type knobs from AM-FM chassis controls.
18. Remove 3 screws holding record changer to mounting rack.
19. Lift record changer and remove phono audio plug from AM-FM chassis.
20. Remove record changer.
21. Remove FM antenna from screw terminals on rear of cabinet.
22. Remove ground strap from left FM antenna terminal.
23. Remove 2 phillips head screws holding antenna terminal strip to rear of cabinet.
24. Remove two 5/16" hex head bolts holding loop antenna to rear of record changer rack. (Note: Wooden spacers are between loop and rack).
25. Unsolder loop antenna leads at loop.
26. Remove loop antenna.
27. Remove five screws holding AM-FM chassis to mounting.
28. Remove AM-FM chassis.

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.4VDC	0V	6.3VAC	0V	110VDC	110VDC	0V		
V 2	6J6	95VDC	75VDC	6.3VAC	0V	-1.7VDC	§-4.9VDC	0V		
V 3	6AU6	-.3VDC	0V	6.3VAC	0V	130VDC	130VDC	.5VDC		
V 4	6AU6	-.4VDC	0V	6.3VAC	0V	130VDC	130VDC	.5VDC		
V 5	6AU6	0V	0V	6.3VAC	0V	132VDC	132VDC	1.3VDC		
V 6	6AL5	0V	0V	6.3VAC	0V	0V	0V	-.4VDC		
V 7	6AC7	0V	0V	0V	-.5VDC	.3VDC	62VDC	6.3VAC	120VDC	
V 8	6AU6	◓-6.8VDC	0V	0V	6.3VAC	◓ -140VDC	115VDC	◓0V		
V 9	6AU6	0V	0V	6.3VAC	0V	75VDC	75VDC	.8VDC		
V 10	6AU6	0V	0V	6.3VAC	0V	155VDC	155VDC	2.2VDC		
V 11	6AL5	.1VDC	.1VDC	6.3VAC	0V	.1VDC	0V	0V		
V 12	6AU6	-2.2VDC	0V	6.3VAC	0V	145VDC	57VDC	0V		
V 13	6SN7GT	-87VDC	100VDC 310VDC	0V	0V	130VDC	6VDC	6.3VAC	0V	
V 14	6K6GT	0V	0V	280VDC	280VDC	0V	.1VDC 40VDC	6.3VAC	31VDC 55VDC	
V 15	6AL5	.4VDC	.4VDC	0V	6.3VAC	4VDC	0V	-2.4VDC		
V 16	6SN7GT	.2VDC	225VDC	10VDC	-1.9VDC	80VDC	10VDC	6.3VAC	0V	
V 17	6BG6G	235VDC	6.3VAC	6.8VDC	0V	-.1VDC	0V	0V	235VDC	TOP CAP *
V 18	6W4	0V	0V	415VDC	0V	330VDC	0V	6.3VAC	0V	
V 19	1B3GT	* DO NOT MEASURE								
V20A	12AT7	200VDC	§-.5VDC	0V	0V	0V	210VDC	-.3VDC	3.2VDC	6.3VAC
‡ V20B	12AT7	200VDC	§-.8VDC	0V	0V	0V	210VDC	0V	4.8VDC	6.3VAC ‡
V21	6BA6	-.6VDC	0V	0V	6.3VAC	250VDC	100VDC	0V		
V22A	6BA6	-.4VDC	0V	0V	6.3VAC	0V	0V	0V		
‡ V22B	6BA6	-.3VDC	0V	0V	6.3VAC	225VDC	90VDC	0V		‡
‡ V23	6AL5	I.5VDC	-.4VDC	6.3VAC	0V	0V	0V	0V		‡
V24A	6SJ7GT	0V	0V	0V	-.8VDC	0V	15VDC	6.3VAC	20VDC	
V24B	6SQ7	0V	-.8VDC	0V	0V	0V	87VDC	6.3VAC	0V	
V25	6SQ7GT	0V	-.8VDC	0V	0V	0V	65VDC	6.3VAC	0V	
V26	6K6GT	0V	0V	185VDC	187VDC	0V	0V	6.3VAC	12.5VDC	
V27A	6K6GT	0V	0V	185VDC	187VDC	0V	0V	6.3VAC	12.5VDC	
V27B	6V6GT	0V	0V	250VDC	260VDC	0V	0V	6.3VAC	12.5VDC	
V28	5U4G	0V	350VDC	0V	300VAC	0V	300VAC	0V	350VDC	
V29	6X5GT	0V	0V	155VAC	0V	155VAC	0V	6.3VAC	155VDC	
V30	10LP4	0V	0V	PIN 10 350VDC	PIN 11 57VDC	PIN 12 6.3VAC				

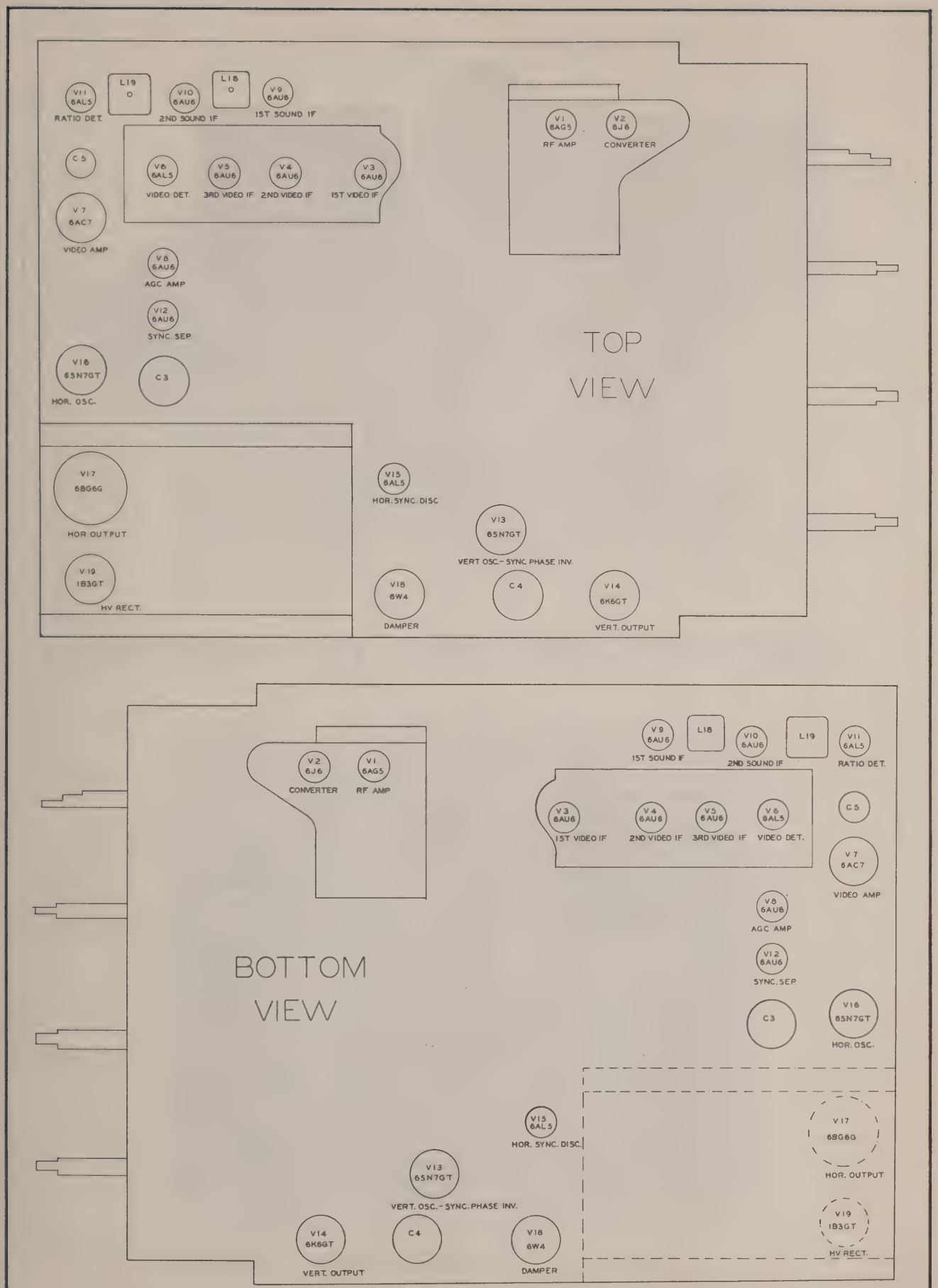
§ Taken with vacuum tube voltmeter.
‡ Taken in FM position.
◓ Measured from pin 7 of V8.
* Do not measure.

RESISTANCE READINGS

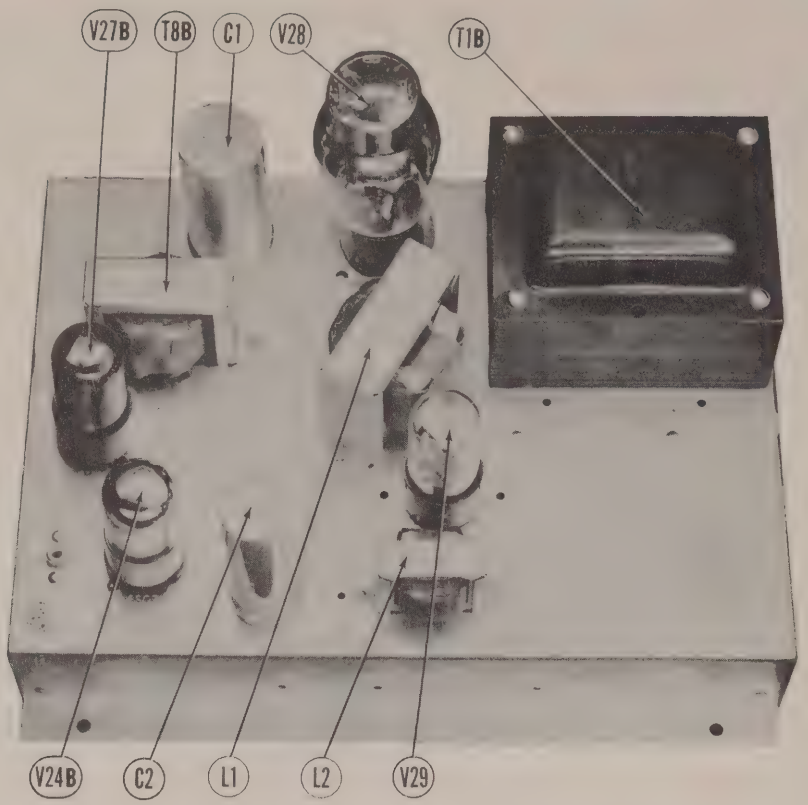
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	200KΩ	0Ω	.1Ω	0Ω	†2.5KΩ	†2.5KΩ	0Ω		
V 2	6J6	†5KΩ	†15KΩ	.1Ω	0Ω	220KΩ	10KΩ	0Ω		
V 3	6AU6	110KΩ	0Ω	.1Ω	0Ω	†1000Ω	†1000Ω	39Ω		
V 4	6AU6	100KΩ	0Ω	.1Ω	0Ω	†1000Ω	†1000Ω	39Ω		
V 5	6AU6	0Ω	0Ω	.1Ω	0Ω	†1000Ω	†1000Ω	100Ω		
V 6	6AL5	0Ω	0Ω	.1Ω	0Ω	0Ω	0Ω	4.7KΩ		
V 7	6AC7	0Ω	0Ω	0Ω	4.7KΩ	68Ω	†20KΩ	.1Ω	†5KΩ	
V 8	6AU6	†50KΩ	†140Ω	0Ω	.1Ω	250KΩ	#30KΩ	†140Ω		
V 9	6AU6	0Ω	0Ω	.1Ω	0Ω	#20KΩ	#20KΩ	150Ω		
V 10	6AU6	0Ω	0Ω	.1Ω	0Ω	#6KΩ	#6KΩ	330Ω		
V 11	6AL5	Inf.	Inf.	.1Ω	0Ω	30KΩ	0Ω	560Ω		
V 12	6AU6	2.2 Meg.	0Ω	.1Ω	0Ω	†8.2KΩ	†100KΩ	0Ω		
V 13	6SN7GT	2.5 Meg.	#2 Meg. #300KΩ	0Ω	1 Meg.	†6.5KΩ	3.3KΩ	.1Ω	0Ω	
V 14	6K6GT	Inf.	0Ω	#2.5KΩ	#2.5KΩ	2.2 Meg.	4.5KΩ 7Ω	.1Ω	6KΩ 1.8KΩ	
V 15	6AL5	18KΩ	18KΩ	0Ω	.1Ω	4.8 Meg.	0Ω	4.8 Meg.		
V 16	6SN7GT	5 Meg.	#30KΩ	1.5KΩ	85KΩ	#300KΩ	1.5KΩ	.1Ω	0Ω	
V 17	6BG6G	#10KΩ	.1Ω	82Ω	Inf.	1 Meg.	19Ω	0Ω	#10KΩ	TOP CAP #6KΩ
V 18	6W4	Inf.	Inf.	#6KΩ	Inf.	#75Ω	Inf.	.1Ω	0Ω	
V 19	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP #6KΩ
V20A	12AT7	#3KΩ	22KΩ	0Ω	0Ω	0Ω	#3KΩ	3 Meg.	390Ω	.1Ω
‡ V20B	12AT7	#3KΩ	22KΩ	0Ω	0Ω	0Ω	#3KΩ	0Ω	390Ω	.1Ω ‡
V21	6BA6	1.5 Meg.	0Ω	0Ω	.1Ω	#1.5KΩ	#30KΩ	0Ω		
V22A	6BA6	470KΩ	0Ω	0Ω	.1Ω	Inf.	Inf.	0Ω		
‡ V22B	6BA6	470KΩ	0Ω	0Ω	.1Ω	#2.5KΩ	#30KΩ	0Ω		‡
‡ V23	6AL5	15KΩ	15KΩ	.1Ω	0Ω	Inf.	0Ω	Inf.		‡
V24A	6SJ7GT	0Ω	0Ω	0Ω	4.7 Meg.	0Ω	#1.8Meg.	.1Ω	#500KΩ	
V24B	6SQ7	0Ω	4.7 Meg.	0Ω	0Ω	0Ω	#500KΩ	.1Ω	0Ω	
V25	6SQ7GT	0Ω	4.7 Meg.	0Ω	Inf.	Inf.	#500KΩ	.1Ω	0Ω	
V26	6K6GT	Inf.	0Ω	#1.2KΩ	#1000Ω	1 Meg.	0Ω	.1Ω	270Ω	
V27A	6K6GT	Inf.	0Ω	#1.2KΩ	#1000Ω	1 Meg.	0Ω	.1Ω	270Ω	
V27B	6V6GT	Inf.	0Ω	#2KΩ	#2KΩ	470KΩ	Inf.	.1Ω	270Ω	
V28	5U4G	Inf.	20KΩ	Inf.	44Ω	Inf.	42Ω	Inf.	20KΩ	
V29	6X5GT	Inf.	0Ω	52Ω	Inf.	54Ω	Inf.	.1Ω	35KΩ	
V30	10LP4	0Ω	20Ω	PIN 10 #60Ω	PIN 11 500KΩ	PIN 12 .1Ω				

† Measured from pin 8 of V29.
# Measured from pin 8 of V28.
‡ Taken in FM position.

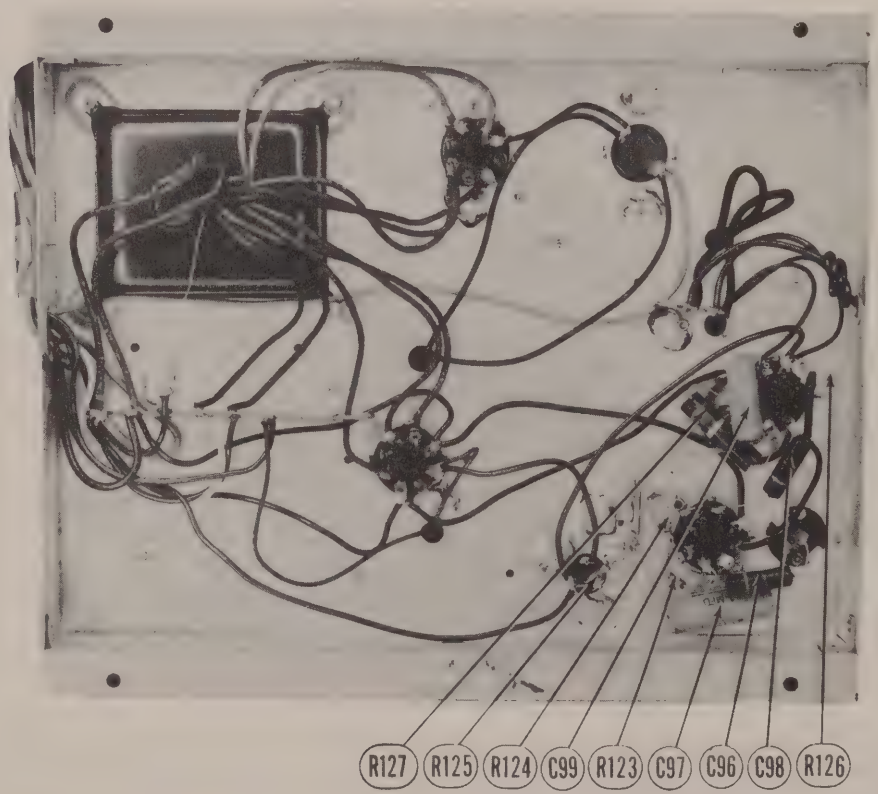
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



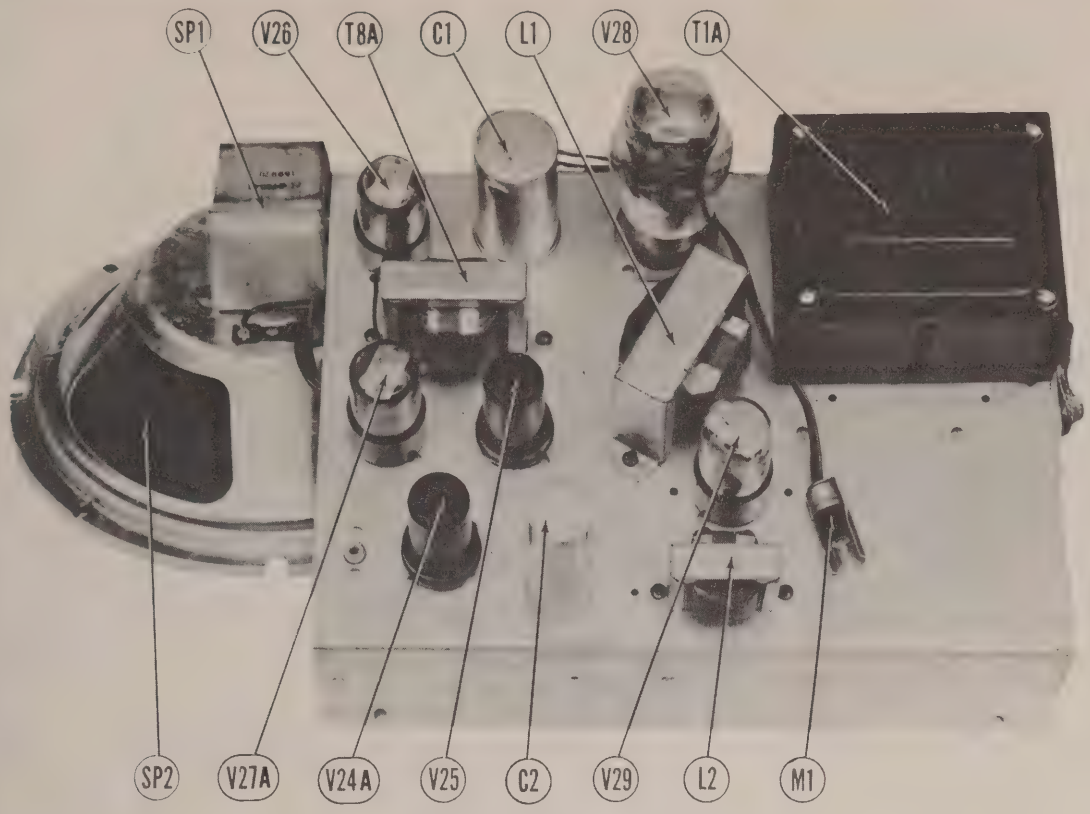
TUBE PLACEMENT CHART



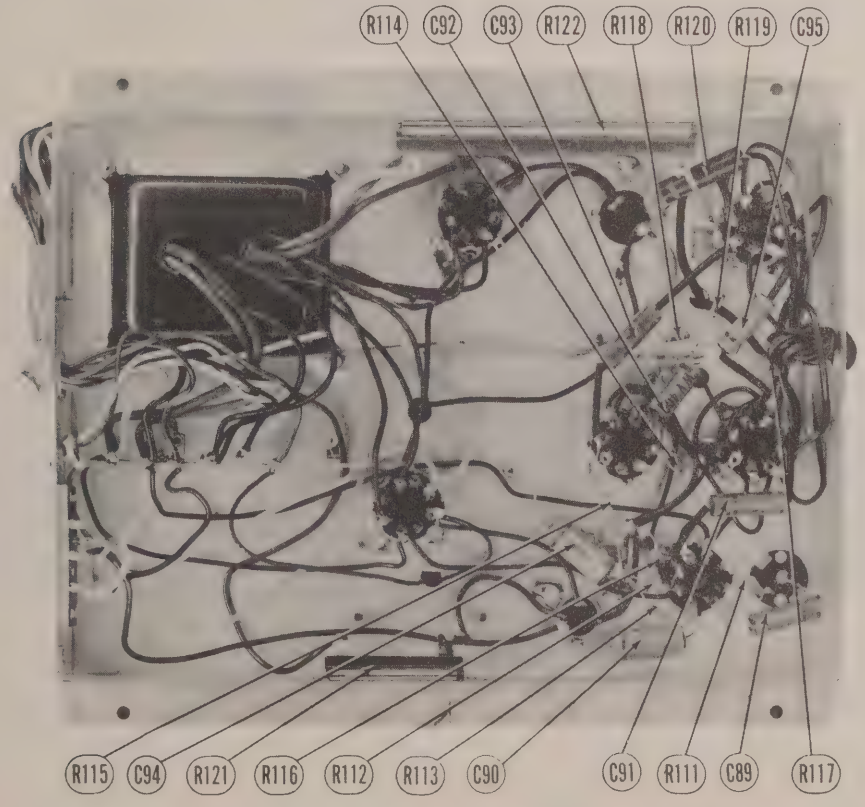
POWER SUPPLY-TOP VIEW-TV ONLY MODELS



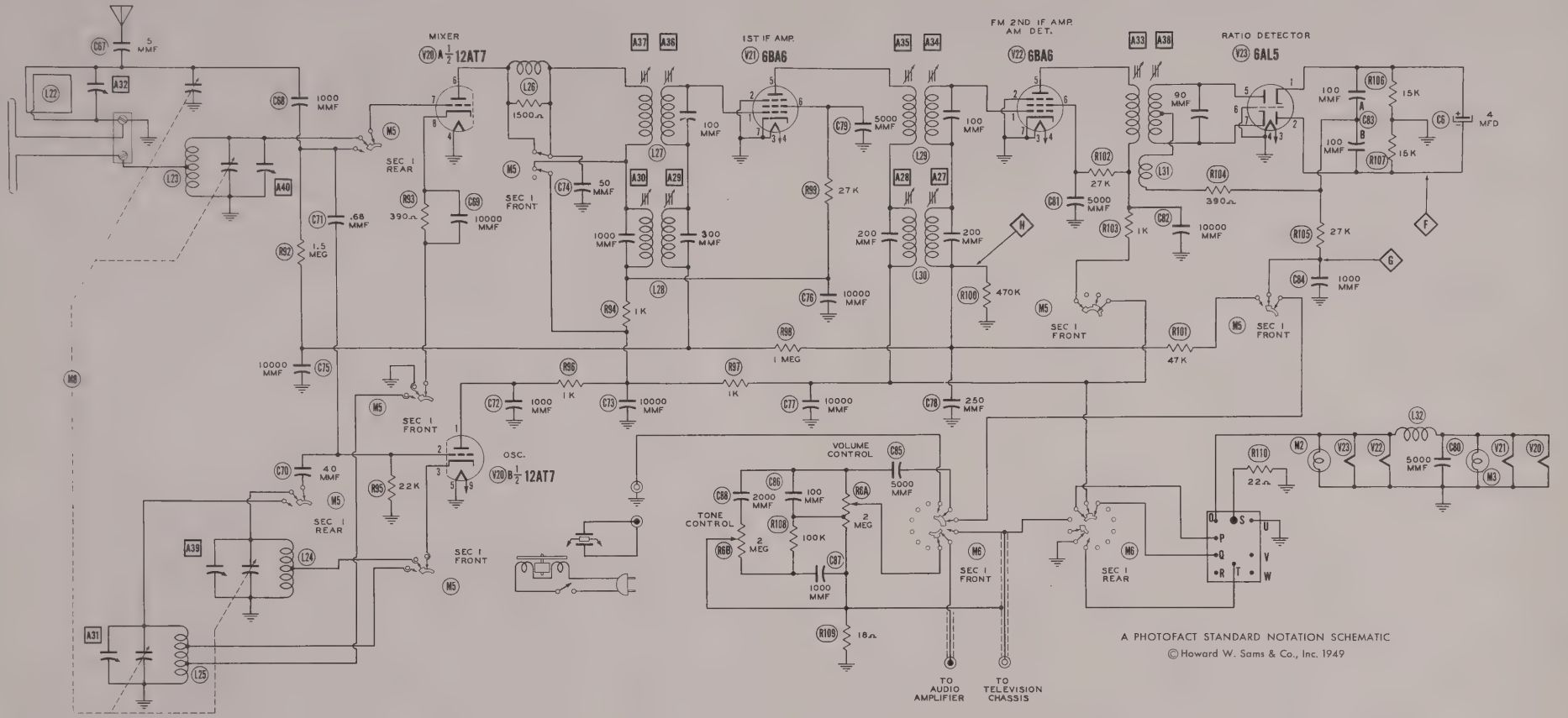
POWER SUPPLY-BOTTOM VIEW-TV ONLY MODELS



POWER SUPPLY-TOP VIEW-COMBINATION MODELS



POWER SUPPLY-BOTTOM VIEW-COMBINATION MODELS


MIXER
V20A 1/2 12AT7
1ST IF AMP.
V21 6BA6
FM 2ND IF AMP. AM DET.
V22 6BA6
RATIO DETECTOR
V23 6AL5
OSC.
V20B 1/2 12AT7
VOLUME CONTROL
TONE CONTROL
SEC 1 REAR
SEC 1 FRONT
TO AUDIO AMPLIFIER
TO TELEVISION CHASSIS
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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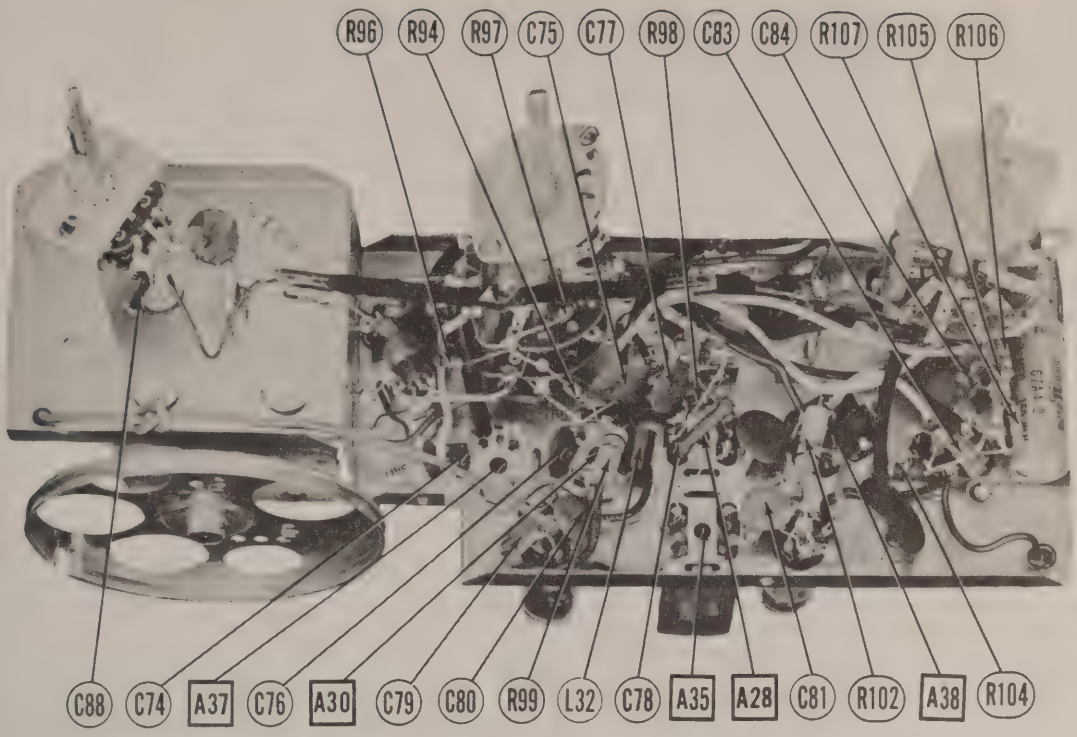
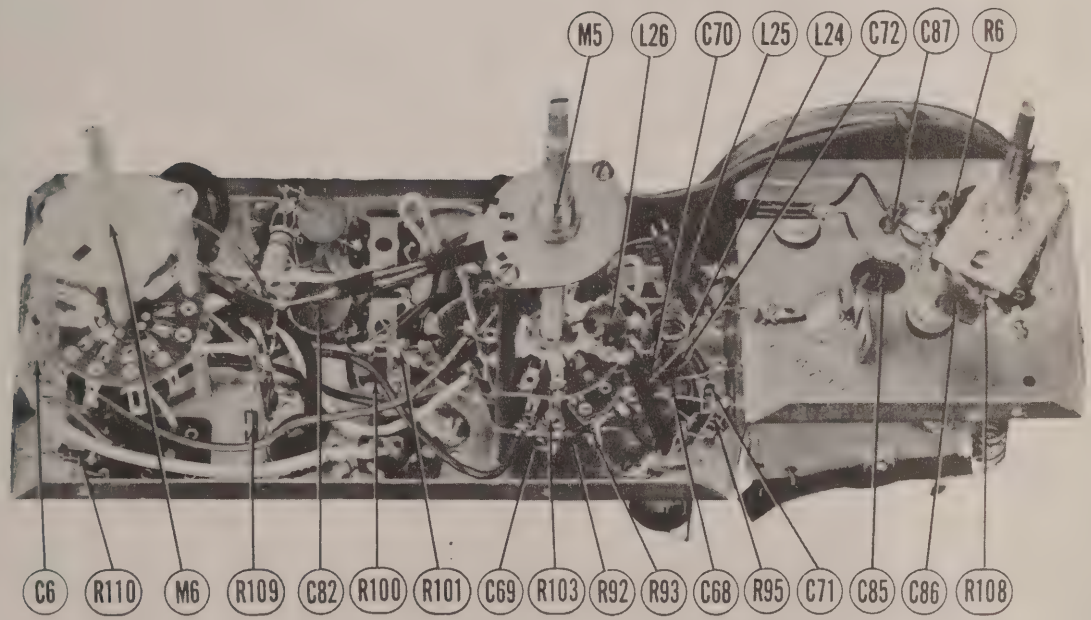
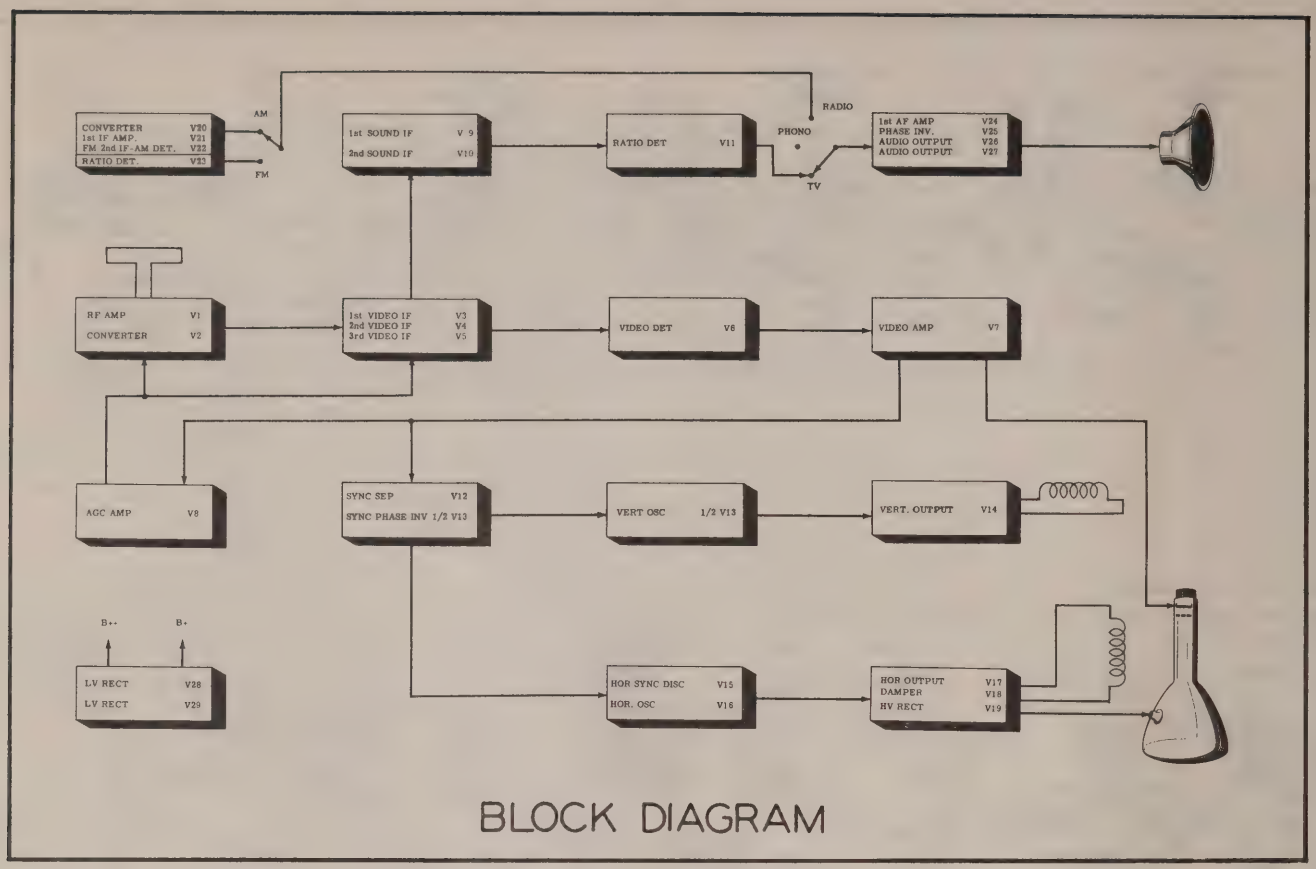


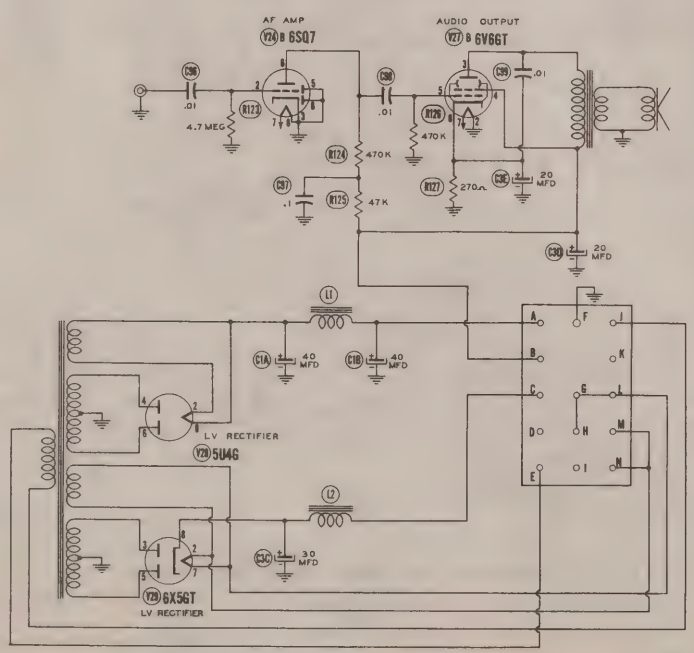
RADIO CHASSIS -BOTTOM VIEW



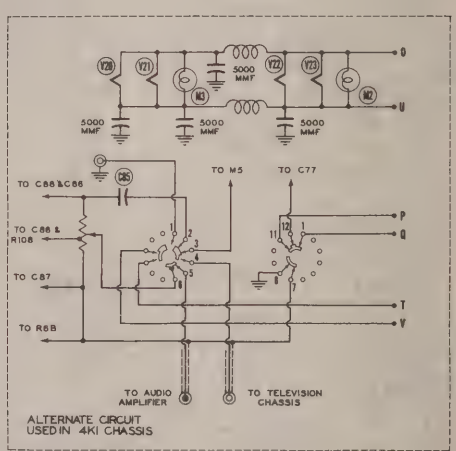
RADIO CHASSIS-BOTTOM VIEW



BLOCK DIAGRAM



POWER SUPPLY-"TV ONLY" MODELS



ALTERNATE CIRCUIT USED IN 4KI CHASSIS

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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AERO RECORD CHANGER
MODEL 47A

FIG. 1—TOP VIEW

GENERAL INFORMATION

The model 47A is a single post changer designed to play up to twelve 12-inch or fourteen 10-inch records at a single loading. The last record will be repeated until the changer is turned off. Power supply is 115 volts 60 cycle.

Manufactured by AERO METAL PRODUCT CORP., 4704 WEST ARTHINGTON, CHICAGO, ILLINOIS

AUTOMATIC OPERATION

1. Raise the record clamp (10) to its vertical position.

2. For 10-inch records, lift the front edge of the record shelf slightly and slide it toward the spindle as far as it will go. For 12-inch records, the shelf is moved back. When setting the shelf back down in its normal position, be sure it goes all the way down.

3. Be sure the spindle guide (1) is down before loading the changer.

4. Place a stack of records on the step of the spindle and lower the record clamp to the records.

5. Press down on the "On" button. This starts the turntable rotating.

6. To start the automatic operation, press down on the "Reject" button and release. The changer will now play the entire stack of records.

7. Any record not required to be played may be automatically rejected by pressing the "Reject" button.

8. To stop the changer, allow the changer to go through a complete change cycle returning the pickup arm to the record, then push on the "Off" button. Lift the pickup arm off the record and place the pickup arm on the pickup rest.

9. Remove the records from the turntable.

CAUTION: Do not use force to start or stop any part of the mechanism, and do not attempt to change the setting of the record shelf while the changer is in cycle.

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DATE 11/49 SET #77 FOLDER #2

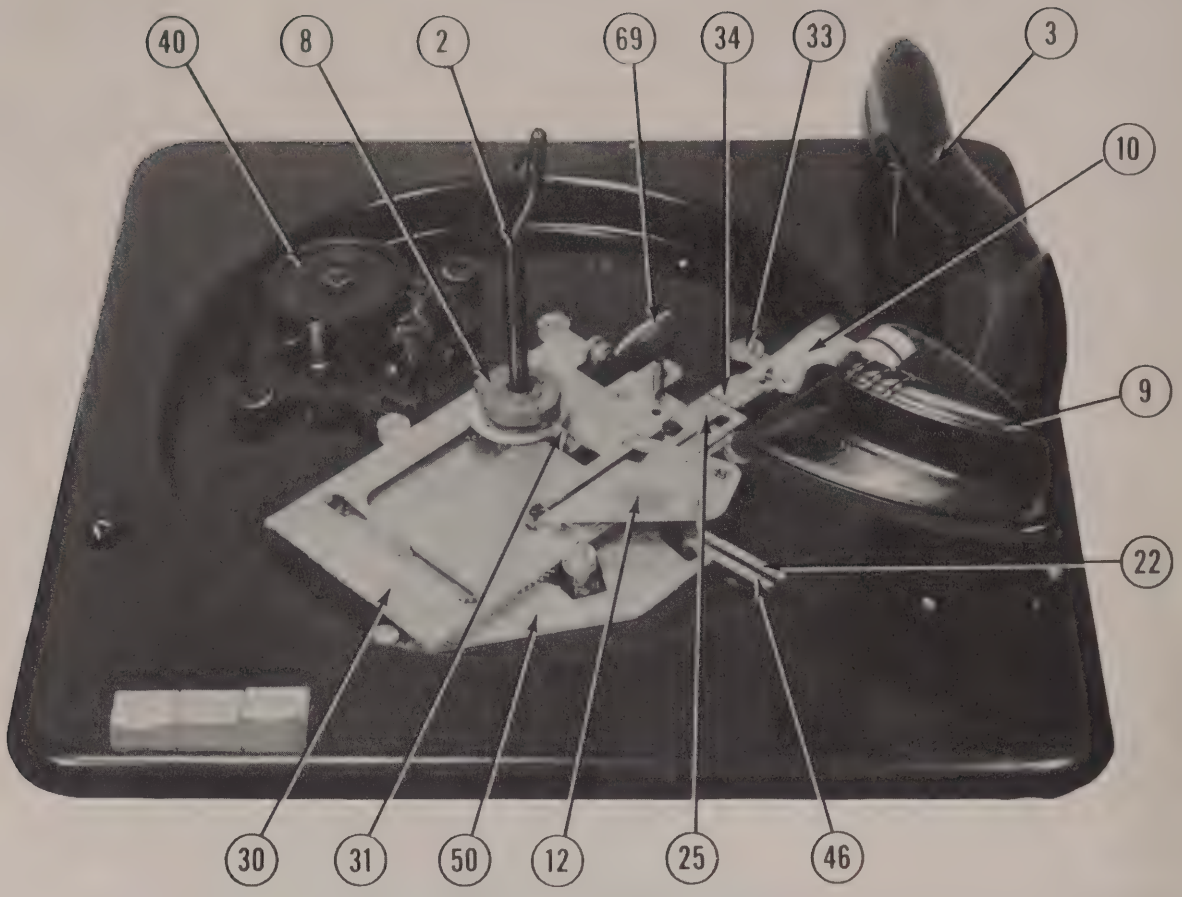

FIG. 2—TOP VIEW LESS TURNTABLE

CHANGE CYCLE

The change cycle is started by moving the reject pawl (31), allowing the clutch arm (26) to engage the clutch (8). This may be done, manually, by pressing the "Reject" button which acts through the reject link (81) and the reject arm (61), or by allowing the pickup arm to approach within 1 15/16" of the record center, in which case, the trip (33), attached to the pickup arm link (34) engages the reject pawl (31).

When the clutch is engaged, the pinion gear (27) turns with the turntable. The pinion then rotates the main gear (42).

As the main gear turns, the cam mounted on the under side of the main gear, pushes the positioner stop (50) out clear of the pickup arm link (34).

The roller (41) of the main gear, acting in the specially shaped slot in the main slide (30), pushes the slide backward. As the slide moves, the lift lever roller (29) pushes down on the lift lever (69), raising the pickup arm off the record.

The end of the long slot in the main slide now contacts the stud on the pickup arm lever (34), moving the pickup arm out clear of the records.

Roller (23) on the slide engages the push off plate (12), moving the record shelf (9) back. This allows a record to drop to the lower ledge of the shelf. At the same time, the cam on the underside of the main gear moves away from the positioner stop (12). The positioner is now pulled in by the spring (83) to a position determined by the setting of the record shelf (9) through the link (46).

The main slide is now reversed in direction. The push-off arm (12) is now moved back, bringing the record shelf forward to its normal position, dropping the bottom record to the turntable.

The horizontal slide (25) engages the stud on the pickup arm link (34), moving the pickup arm back toward the record. The pickup arm is stopped in proper position for set down by the engagement of the pin of the link (34) and the position stop. After the pickup arm link is stopped, the horizontal slide slips on the main slide for the remainder of the slide motion. This is to hold the pickup arm in position while it is being lowered to the record.

The roller (29) now rides off the lift lever (69), allowing the pickup arm to lower on the record. A roller on the underside of the main gear moves the positioner stop (50) away from the pickup arm lever (34) so the pickup arm will be free to move across the record.

The clutch arm (26) now moves against the reject pawl (31), disengaging the clutch arm from the clutch (8). This completes the change cycle.

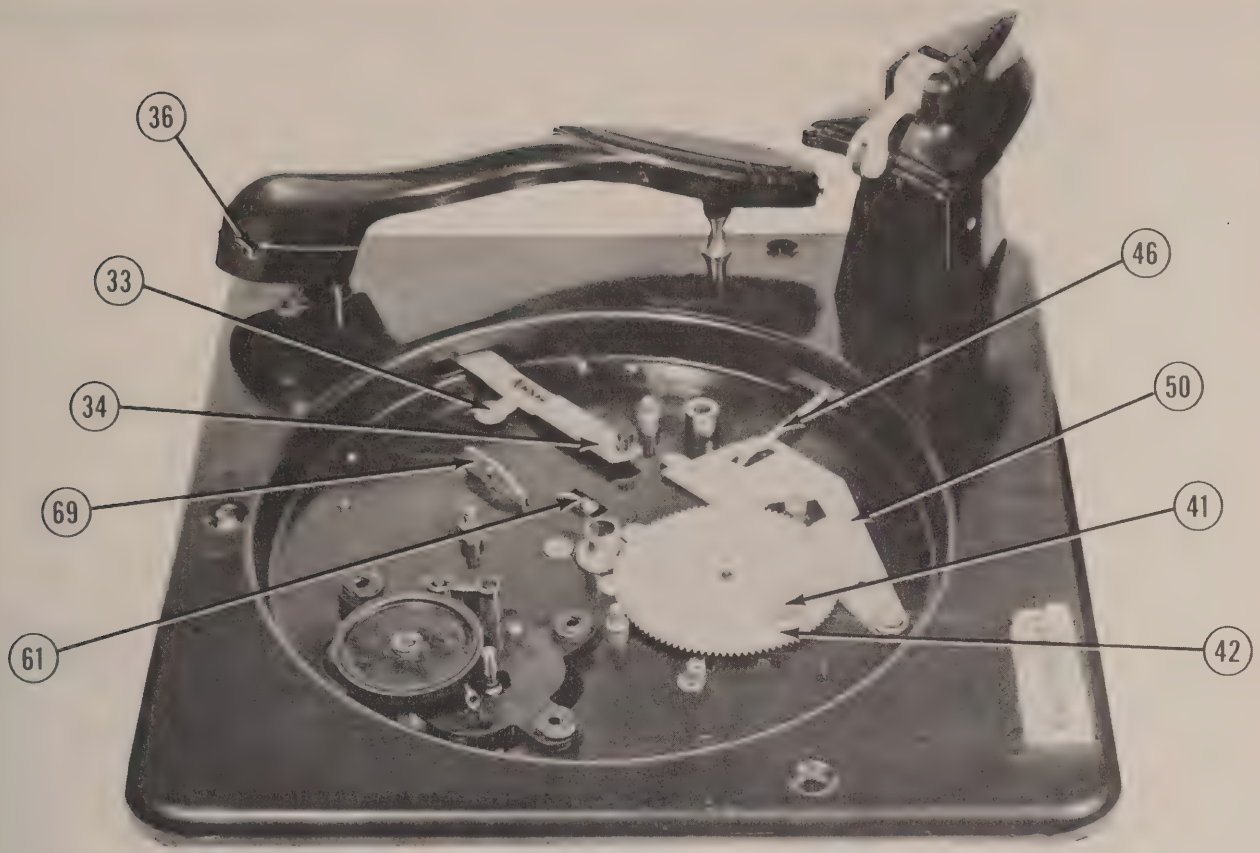

FIG. 3—TOP VIEW LESS MAIN SLIDE

ADJUSTMENTS

Pickup Arm Set-Down

The point at which the needle drops on the record may be adusted by means of the adjusting screw (36), which is reached through the hole in the side near the back of the pickup arm. The needle should set down on the record at a point ⅛ inch from the edge of the record. If the adjustment should happen to be so far off that the adjusting screw will not move the arm far enough, loosen the set screw (37) in the pickup arm mounting assembly (35). While holding the pickup arm to link (34), move the pickup arm to the correct landing position. Tighten the set screw. After this adjustment is made, a finer adjustment is made by the screw (36).

Pickup Arm Height

The height of the pickup arm should be adjusted so the pickup arm will clear a full stack of records on the turntable. If the adjustment is too high, the arm may strike the record shelf in the 10-inch position.

The pickup arm height is adjusted by means of the knurled head screw mounted in the underside of the pickup arm.

Push-Off Head

Before attempting to adjust the push-off head, be sure the spindle (2) is not bent.

To adjust the push-off head, loosen the three screws holding the record support base (43). Place a 10-inch record on the spindle so that it rests on the record shelf. Move the base (43) backward or forward to provide a clearance of 1/32 inch between the edge of the record and the back of the upper ledge of the record support shelf. Be sure to tighten the screws securely after making this adjustment.

Positive Trip

It will be necessary to remove the turntable to adjust the trip point. The trip lever (33) may be adjusted by loosening the two screws (32) and sliding the trip lever on the pickup arm link (34). Sliding the trip lever away from the main slide will cause the changer to trip nearer the center of the record. To make the changer trip earlier slide the trip lever toward the main slide. Be sure to tighten the screws after the adjustment is made.

A PHOTOFACT "EXPLODED" VIEW
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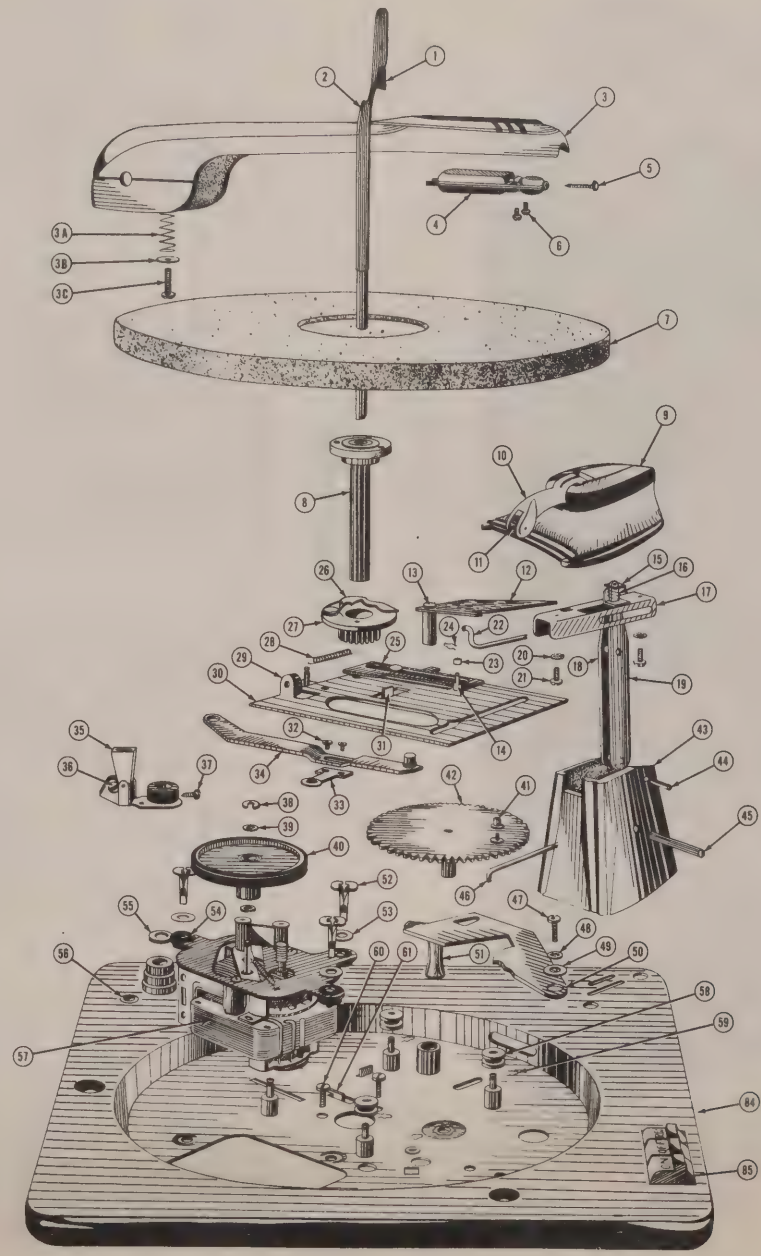

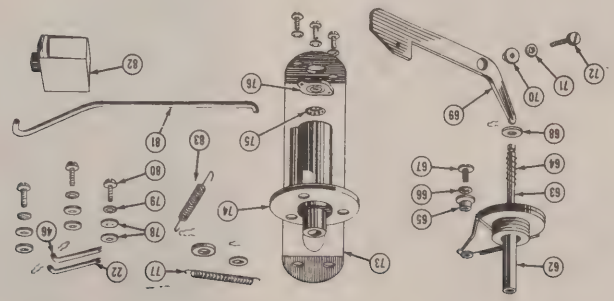
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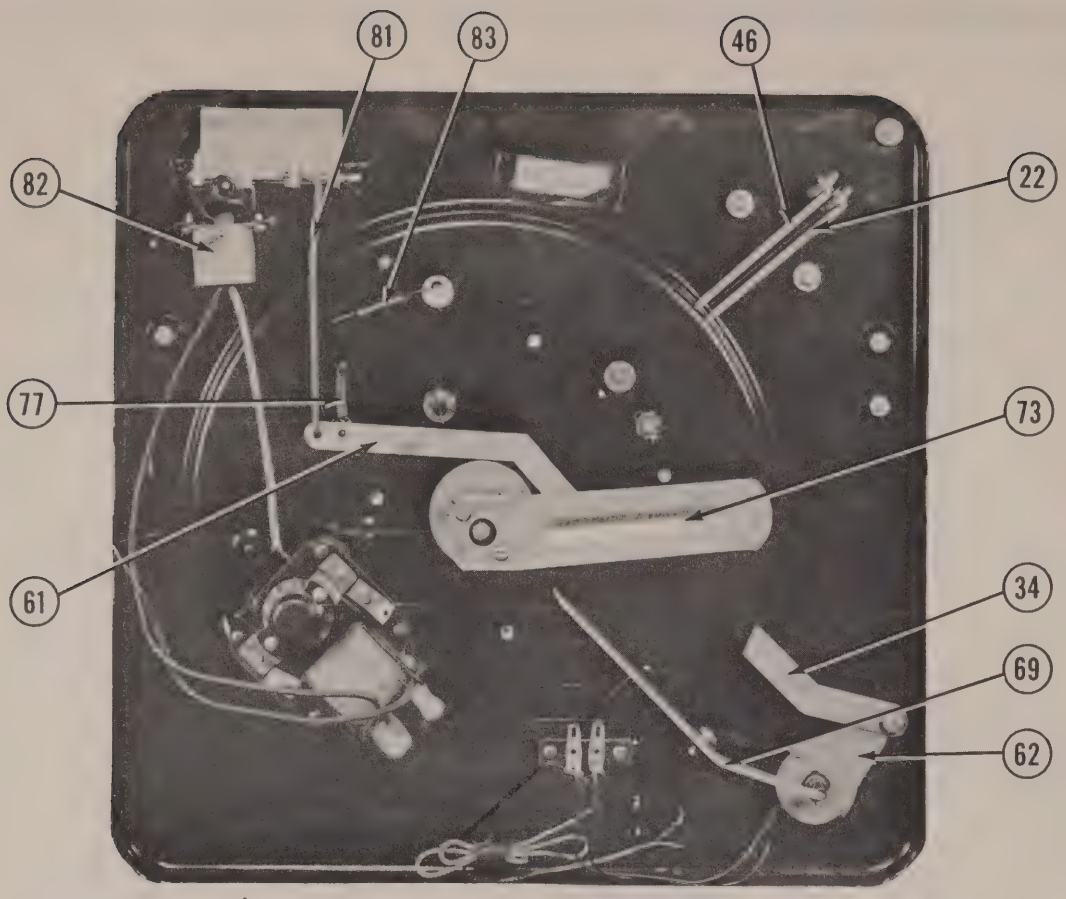

FIG. 4—BOTTOM VIEW

GEAR TIMING AND CLUTCH ADJUSTMENT

The normal position of the main gear (42), while in playing position (out of cycle), is with the roller (41) centered in the slot of the main slide. In this position, the gear snaps into its index position.

To check indexing of the pinion gear (27), rotate the clutch assembly counterclockwise with clutch engaged. The end of the clutch arm should be in line with the edge of the clutch lever as shown in Figure 1.

If the pinion gear has been removed it should be reassembled as follows:

Place the main gear (42) in its index position.

Insert the pinion gear (27) with the large brass rivet opposite the trip lever as shown in Figure 2. The clutch arm will rest on the trip lever. If the gear is properly timed the turntable and clutch assembly will spin freely. If the clutch is not disengaged, remove the assembly and rotate the pinion one tooth clockwise.

For a finer adjustment, the end of the trip lever may be bent. The clutch arm should have the smallest possible clearance while in playing position.

GEAR TIMING AND CLUTCH ADJUSTMENT

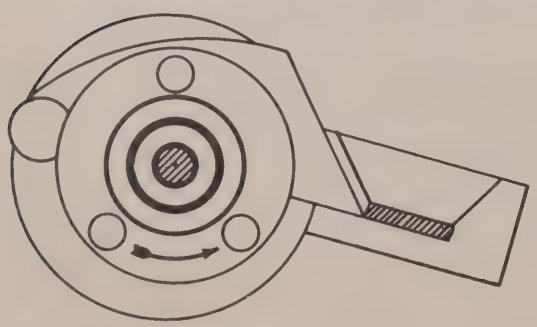

Figure 1

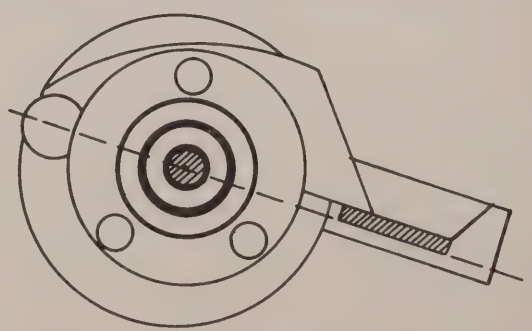

Figure 2

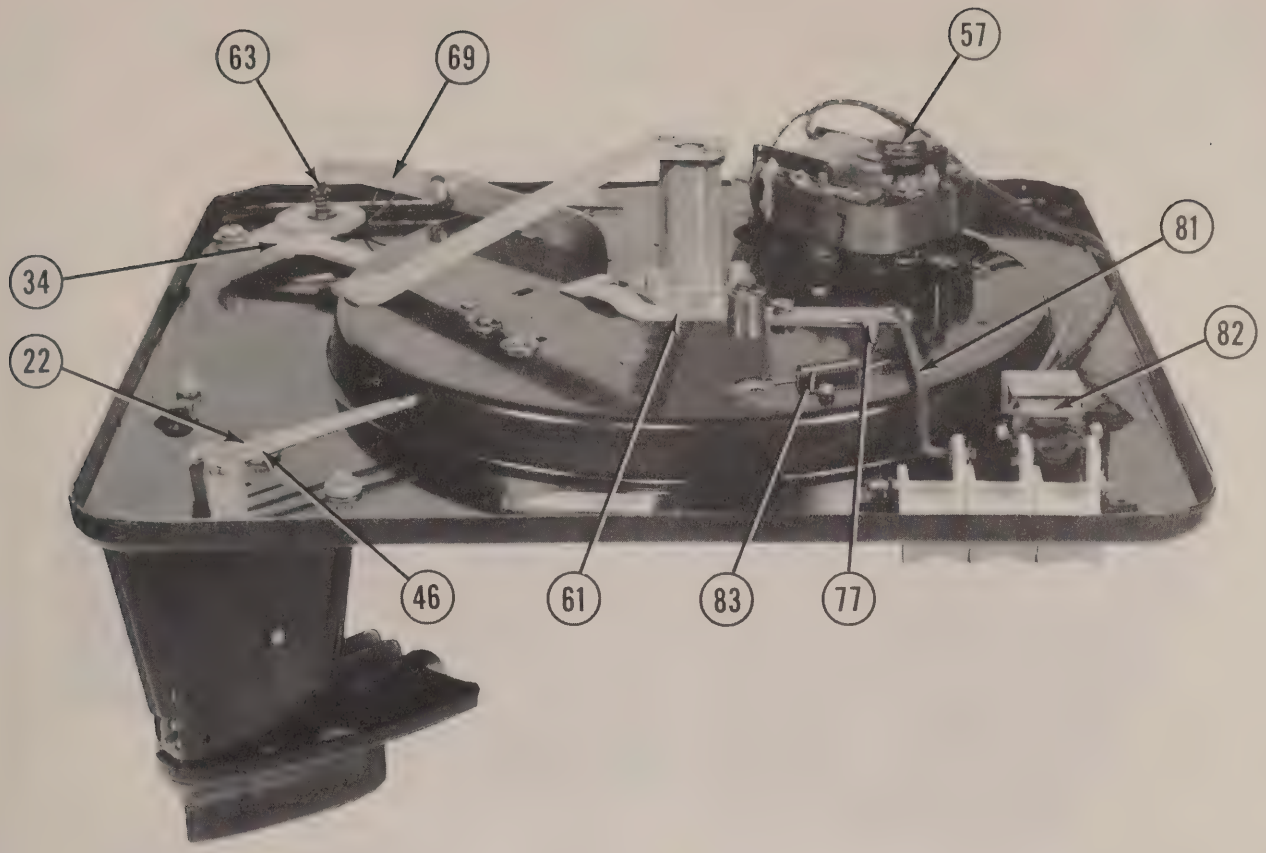

FIG. 5—SIDE VIEW

TROUBLES

Changer Fails to Trip at the End of a Record

1. Remove the turntable and adjust the positive trip lever (33) by moving it toward the main slide. See adjustment in "Positive Trip."

2. Spring on the pinion gear and cam assembly loose or broken, thus leaving the arm (26) in an outward position.

Changer Trips Before End of Record

1. Remove the turntable and adjust the positive trip lever (33) by sliding it away from the main slide. See adjustment on "Positive Trip."

Turntable Speed Slow

1. Grease or oil on the turntable rim and idler wheel. Clean with alcohol or naphtha.

2. Check for binding parts.

Stalling in Cycle

1. Clean grease from turntable rim and idler wheel.

2. Remove turntable and turn the hub (8) by hand. If binding occurs, check for bent parts or heavy burrs.

Changer Fails to Drop Records

1. Check to see that the push-off link (22) is connected.

Fails to Set Down in 10-Inch Position

1. Check to see that the positioner link (46) is connected.

LUBRICATION

Use fine oil sparingly on rollers and other moving parts.

Use Lubriplate or similar grease on the turntable thrust bearing.

The center shaft hub and turntable bearing are self-lubricating and need no oil.

Remove any excess grease on the underside of the main gear. Do not allow any oil or grease to get on the turntable rim or idler wheel.

Do not oil the motor.

PARTS LIST

Ref. No.	Part No.	DESCRIPTION
1		Record guide
2	2205	Spindle
3	3209	Pickup arm
3A	4209	Pickup arm height spring
3B		Flat washer
3C	4215	Adjusting screw
4	3212	Pickup cartridge (Shure P93)
5		Needle screw (part of item 4)
6		Screw 4-36 x ¼
7	3224	Turntable
8	9212	Turntable shaft and clutch assembly
9	3210	Record shelf
10	3211	Clamp
11	3219	Rubber wheel
12	2210	Push-off plate
13	2200	Push-off plate stud
14		Guide stud
15	1224	Washer
16	4216	Channel spring
17	1211	Push-off channel
18	1208	Push-off lever
19	1210	Size change lever
20		Lock washer
21		Screw 6-32 x ¼" R.H.M.S.
22	4205	Push-off link
23	2227	Push-off roller
24	4221	Hairpin clip
25	1221	Pickup horizontal slide
26	1219	Clutch arm
27	1225	Pinion gear and cam assembly
28	4203	Pawl spring
29	2237	Lift lever roller
30	1220	Main slide
31	1222	Reject pawl
32		Screw (part of item 34)
33	1238	Trip finger and roller
34	1214	Pickup arm link
35	9219	Pickup arm mounting assembly
36		Pickup arm setdown adjustment screw (part of item 35)
37		Set screw
38		"C" washer
39		Fiber washer
40		Idler wheel (part of item 57)
41	2222	Gear roller
42	1217	Main gear
43	3208	Record support base
44	2212	Push-off slide rod
45	2213	Push-off lever rod
46	4206	Positioner link
47		Screw 8-32 x 7/16"
48		Lock washer
49	2219	Shoulder bushing
50	1207	Position stop
51	3216	Pickup arm rest
52		Snap fasteners
53		Flat washer
54		Rubber grommets
55		Fiber washer
56		Rubber grommet
57	3204	Motor
58	2227	Roller
59	4220	Hair-pin clip
60		Screw 8-32
61	1234	Reject arm
62	9226	Pickup arm shaft assembly
63	2216	Lift rod
64		Lift rod spring
65	2219	Pickup arm shoulder bushing
66		Lock washer
67		Screw 8-32 x 7/16 F.H.M.S.
68		Flat washer
69	1216	Lift lever
70		Shoulder bushing
71		Lock washer
72		Screw 8-32 x 7/16 F.H.M.S.
73	1230	Bearing bracket
74	2209	Turntable main bearing
75	1229	Ball-bearing retainer
76	1226	Spindle support plate
77	4202	Reject spring
78		Flat washer
79		Lock washer
80		Screw
81	4201	Reject link
82	3203	Slide switch
83	4204	Position stop spring
84	1200	Base plate
85		Control buttons
	3200	Push button—on
	3201	Push button—off
	3202	Push button—reject

BELL SOUND
MODEL 2122

BELL SOUND
MODEL 2122

BELL SOUND MODEL 2122

TRADE NAME	Bell Sound, Model 2122
MANUFACTURER	Bell Sound Systems Inc., 1183 Essex Ave., Columbus 3, OHIO
TYPE SET	AC Operated 4 Channel Audio Amplifier
TUBES(SIX)	Types 6SC7 Pre Amp., 6SC7 1st AF Amp., 6SL7GT 2nd AF-Phase Inverter,(2) 6V6GT Power Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC RATING: .67 Amp. @ 117 Volts AC

INPUTS

Four input channels are provided. They are for radio, crystal pickup and two magnetic pickups. The two magnetic pickup inputs incorporate built in pre-amplification and individual bass equalization. Mag 1 is used for magnetic-induction types and Mag 2 for Variable reluctance type.

OUTPUTS

Output impedances on the the screw type terminals are 3.4 - 4Ω, 6 - 8Ω, and 15 - 18Ω.

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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PARTS LIST AND DESCRIPTIONS

BELL SOUND MODEL 2122

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: BELL SOUND PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	Pre-Amp.	6SC7	6SC7	8S	
V2	1st AF Amp.	6SC7	6SC7	8S	
V3	2nd AF Amp.-Phase Inverter	6SL7GT	6SL7GT	8BD	
V4	Power Output	6V6GT	6V6GT	7AC	
V5	Power Output	6V6GT	6V6GT	7AC	
V6	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: BELL SOUND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	20	450		AF44J	UP2245		EL-220	▲ Filter
B	20	450						■ Filter
C2A	10	450		AF22J	UP1145		EL-210	■ Filter
B	10	450						▲ Filter
C3	150	50		{PRS50/100 PRS50/50	UP150-50		EL-50*	Audio Cathode Bypass
C4	10	25		PRS25/10	BR102A		TVA-5	Audio Cathode Bypass
C5	10	25		PRS25/10	BR102A		TVA-5	Output Cathode Bypass
C6	.25	150		P488-25	GT2P25		TC-2	Audio Coupling
C7	.25	150		P488-25	GT2P25		TC-2	Audio Coupling
C8	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Tone Compensation
C9	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Tone Compensation
C10	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C11	.02	600		P688-02	GT6S2		TM-12	Audio Grid Filter
C12	.05	600		P688-05	GT6S5		TM-15	Audio Coupling
C13	300	500		1468-0003	5W5T3	GP2K-300	MS-33	Tone Compensation
C14	.02	600		P688-02	GT6S2		TM-12	Audio Coupling
C15	300	500		1468-0003	5W5T3	GP2K-300	MS-33	Tone Compensation
C16	.003	600		P688-003	GT6D3	GP2M-003	TM-23	Tone Compensation
C17	.003	600		P688-003	GT6D3	GP2M-003	TM-23	Tone Compensation
C18	.001	600		P688-001	GT6D1	GP2L-001	TM-21	Tone Compensation
C19	.05	600		P688-05	GT6S5		TM-15	Audio Coupling
C20	.05	600		P688-05	GT6S5		TM-15	Audio Coupling
C21	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Output Grid Bypass

■ Use new mounting plate.

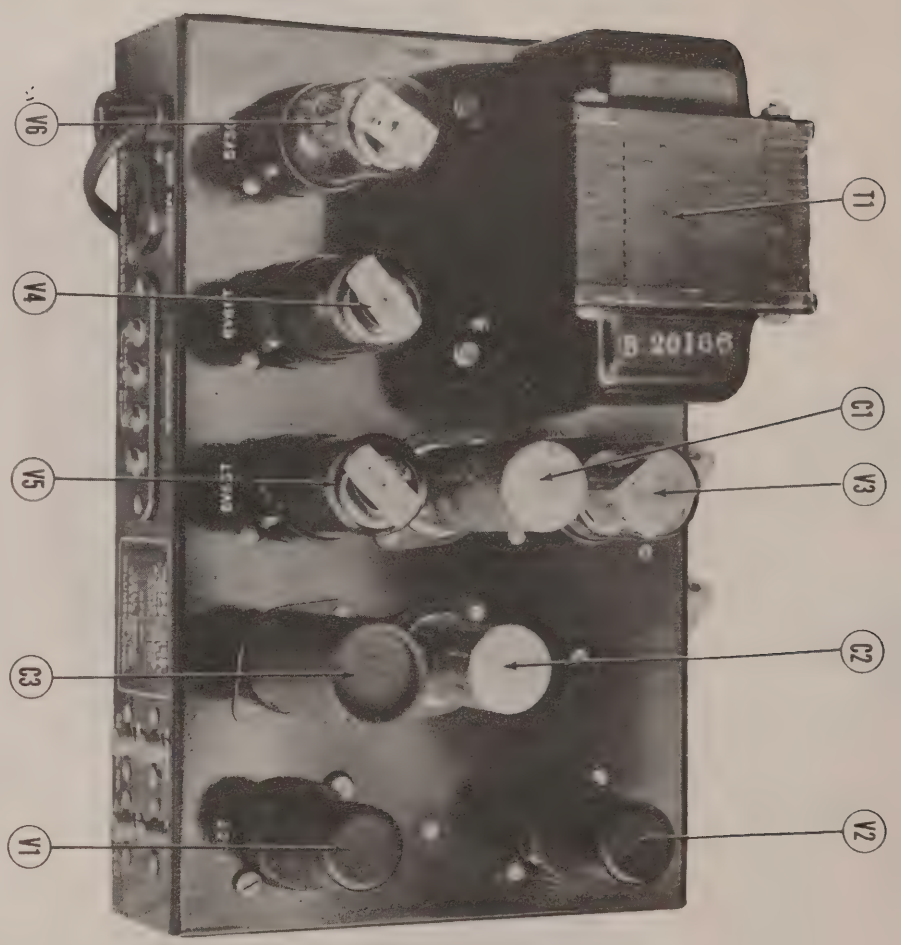
CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BELL SOUND PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1	500KΩ	½		Q13-133	M-60-Z	Volume Control
R2	1 Meg.	½		Q13-137	M-63-Z	Bass Control
R3	1 Meg.	½		Q13-137	M-63-Z	Treble Control

RESISTORS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: BELL SOUND PART No.	IRC PART No.	IDENTIFICATION CODES
R4	22KΩ	½		BTS-22K	Microphone Shunt
R5	820KΩ	½		BTS-820K	Voltage Divider
R6	220KΩ	½		BTS-220K	Voltage Divider
R7	3 Meg	½		BTS-3.3 Meg	1st Mic. Amp. Grid
R8	100KΩ	½		BTS-100KΩ	1st Mic. Amp Plate Load
R9	3 Meg	½		BTS-3.3 Meg	2nd Mic. Amp. Grid
R10	100KΩ	½		BTS-100KΩ	2nd Mic. Amp. Plate Load
R11	270KΩ	½		BTS-270K	Audio Coupling
R12	270KΩ	½		BTS-270K	Audio Coupling
R13	220KΩ	½		BTS-220K	Audio Coupling
R14	1 Meg	½		BTS-1 Meg	Audio Coupling

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	BELL SOUND PART No.	IRC PART No.	
R15	270KΩ	½		BTS-270K	Audio Coupling
R16	270KΩ	½		BTS-270K	Audio Coupling
R17	10KΩ	½		BTS-10K	AF Grid
R18	82KΩ	½		BTS-82K	AF Grid Filter
R19	2200Ω	½		BTS-2200	AF Cathode
R20	100KΩ	½		BTS-100K	AF Plate Load
R21	270KΩ	½		BTS-270K	AF Plate Load
R22	100KΩ	½		BTS-100K	Decoupling
R23	47KΩ	½		BTS-47K	Decoupling
R24	270KΩ	½		BTS-270K	Tone Compensation
R25	47KΩ	½		BTS-47K	Tone Compensation
R26	2000Ω	½		BTS-2200	Feedback
R27	47Ω	½		BW-½-47	Feedback
R28	1000Ω	½		BTS-1000	AF Cathode
R29	100KΩ	½		BTS-100K	AF Plate Load
R30	1000Ω	½		BTS-1000	Phase Inverter Cathode
R31	100KΩ	½		BTS-100K	Phase Inverter Plate Load
R32	7500Ω	½		BTS-8200	Phase Inverter Grid
R33	200KΩ	½		BTS-220K	Output Grid
R34	270KΩ	½		BTS-270K	Output Grid
R35	200Ω	5		AB-200	Output Cathode
R36	3000Ω	2		BT-2-3300	Filter
R37	25KΩ	10		AB-25000	Bleeder
R38	100KΩ	½		BTS-100K	Gain Control Shunt

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA			
	PRI.	SEC. 1	SEC. 2	SEC. 3	BELL SOUND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ .67A	620VCT @ .097ADC	6.3VAC @ 2.1A		B-20166	P-4079 †	P-3152 †	PV-90 †

† Drill new mounting holes and add series resistor to reduce plate voltage.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		BELL SOUND PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	12KΩ CT	15-18Ω 6-8Ω 3.4-4Ω	390Ω CT	1.2Ω .7Ω .5Ω	B-20159				

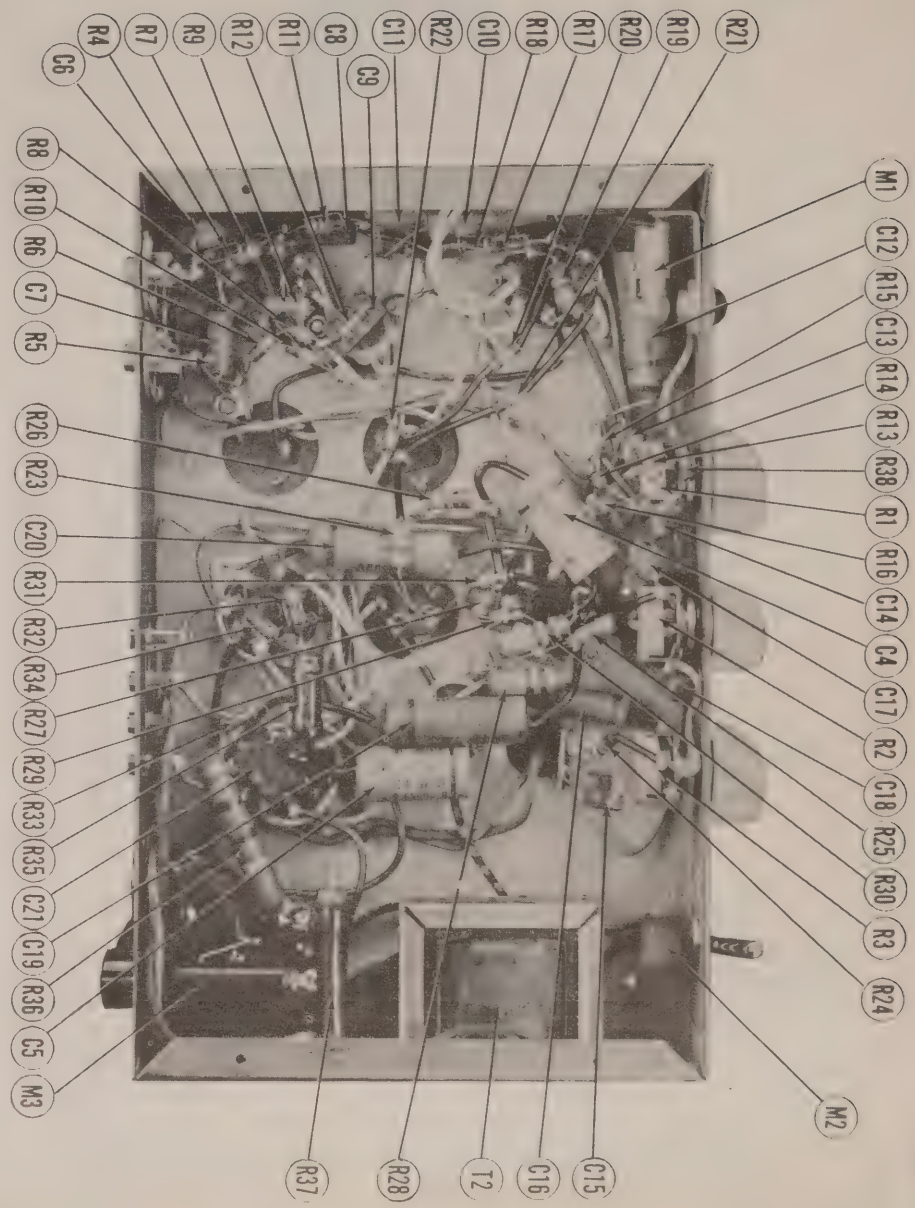
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					BELL SOUND PART No.		
M1	Bayonet	7.5	.2	White			Type #51

MISCELLANEOUS

ITEM No.	PART NAME	BELL SOUND PART No.	NOTES
M2	Switch		On-Off
M3	Fuse		2 Amp.

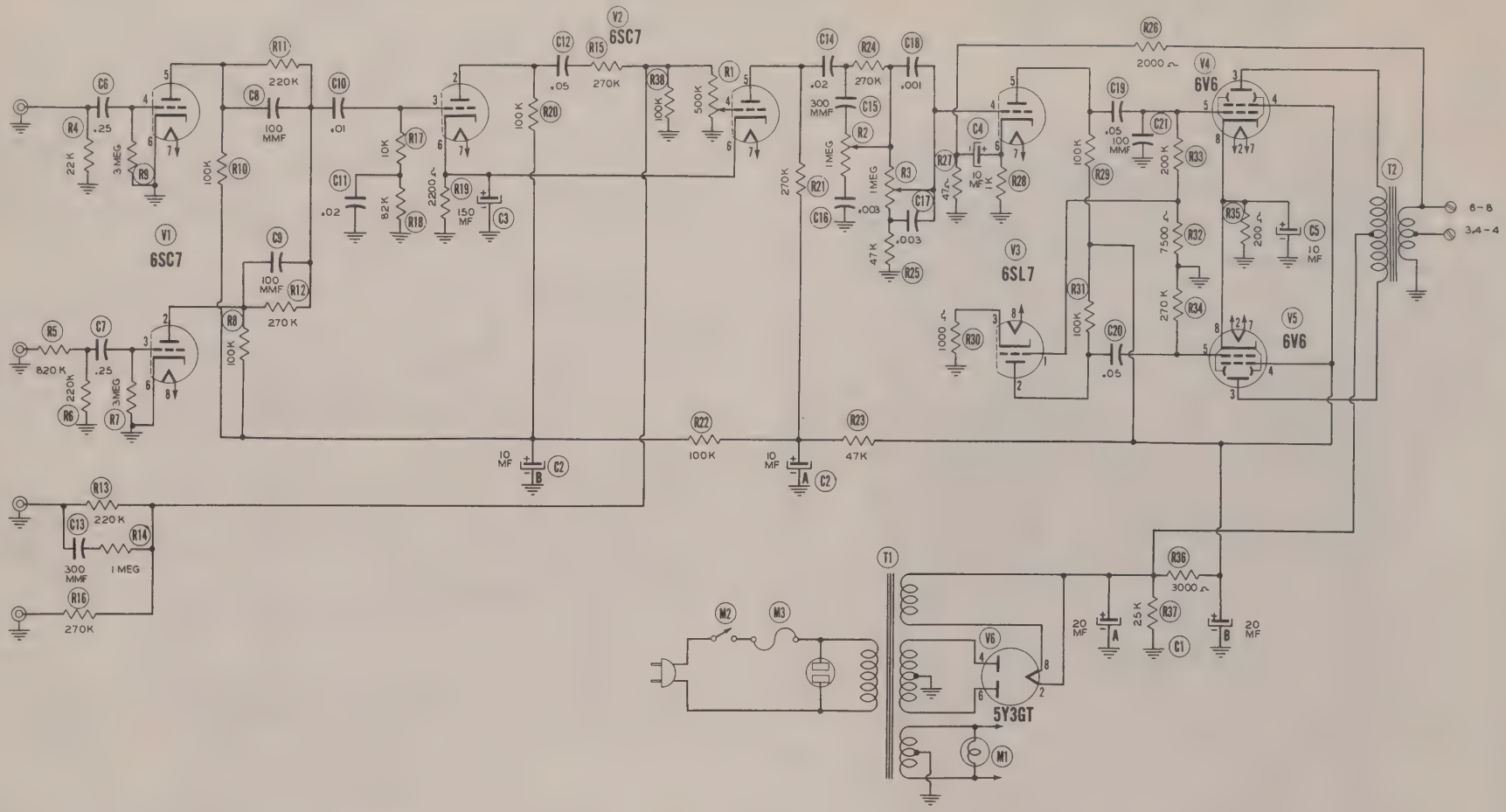
CHASSIS—BOTTOM VIEW



DATE 11/49 SET #77 FOLDER 3

BELL SOUND MODEL 2122

BELL SOUND MODEL 2122



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SC7	0V	55VDC	-.6VDC	-.6VDC	55VDC	0V	#3.2VAC	#3.2VAC
V 2	6SC7	0V	75VDC	0V	0V	100VDC	1.4VDC	#3.2VAC	#3.2VAC
V 3	6SL7GT	0V	145VDC	1.3VDC	0V	145VDC	1.3VDC	#3.2VAC	#3.2VAC
V 4	6V6GT	0V	#3.2VAC	310VDC	290VDC	.1VDC	0V	#3.2VAC	18.5VDC
V 5	6V6GT	0V	#3.2VAC	310VDC	290VDC	.1VDC	0V	#3.2VAC	18.5VDC
V 6	5Y3GT	0V	320VDC	0V	320VDC	0V	320VDC	0V	320VDC

6.3VAC measured across filaments.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6SC7	0Ω	†250KΩ	3.3 Meg.	3.3 Meg.	†250KΩ	0Ω	.1Ω	.1Ω
V 2	6SC7	0Ω	†250KΩ	90KΩ	8Ω	†320KΩ	2.2KΩ	.1Ω	.1Ω
V 3	6SL7GT	7.5KΩ	†100KΩ	1000Ω	47KΩ	†100KΩ	1KΩ	.1Ω	.1Ω
V 4	6V6GT	0Ω	.1Ω	125Ω	†3KΩ	200KΩ	7.5KΩ	.1Ω	200Ω
V 5	6V6GT	0Ω	.1Ω	†170Ω	†3KΩ	270KΩ	7.5KΩ	.1Ω	200Ω
V 6	5Y3GT	Inf.	25KΩ	Inf.	120Ω	Inf.	127Ω	Inf.	25KΩ

† Measured from pin 2 of V6.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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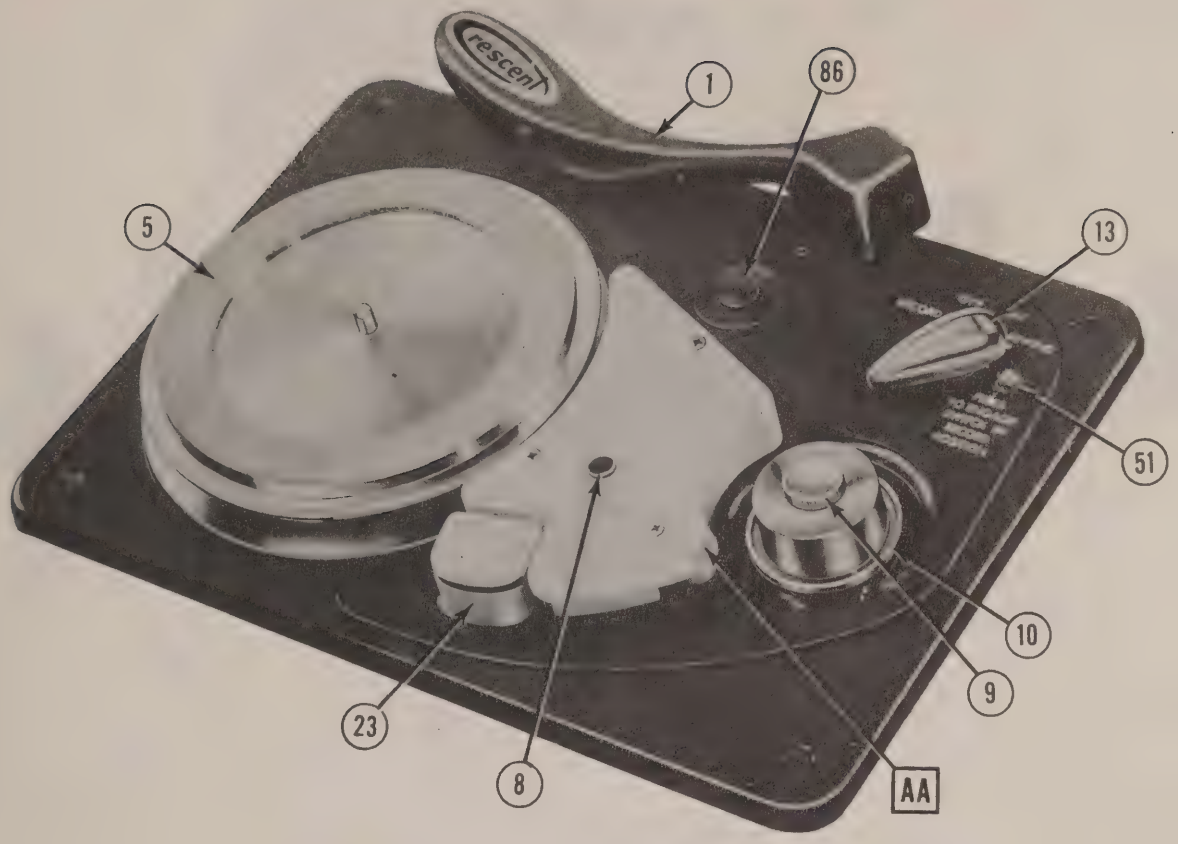
1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.



GENERAL INFORMATION

The Crescent 1000 Series wire recorder is a combination record player and magnetic recorder-reproducer. The standard spool gives approximately an hour of continuous recording. The recordings may be played back immediately after the wire has been rewound. A recording will last indefinitely since the playback process has no effect on the wire; or a new recording may be made on an old spool, since in the recording process, any previous recording is erased. The turntable serves as a turntable for standard records as well as the takeup spool for the recording mechanism. One motor is used, which, through the action of the control mechanism, serves as a drive to the turntable and also for the rewind pulley. The rewind speed is greater by the ratio of pulleys used.

A plastic tape leader is attached at each end of the wire, which is used to thread the wire on the turntable, or the storage spool, and the other to trip the reset switch to shut off the motor at the end.

Manufactured by

CRESCENT INDUSTRIES, INC. • 3432 MILWAUKEE AVENUE

CHICAGO 41, ILLINOIS

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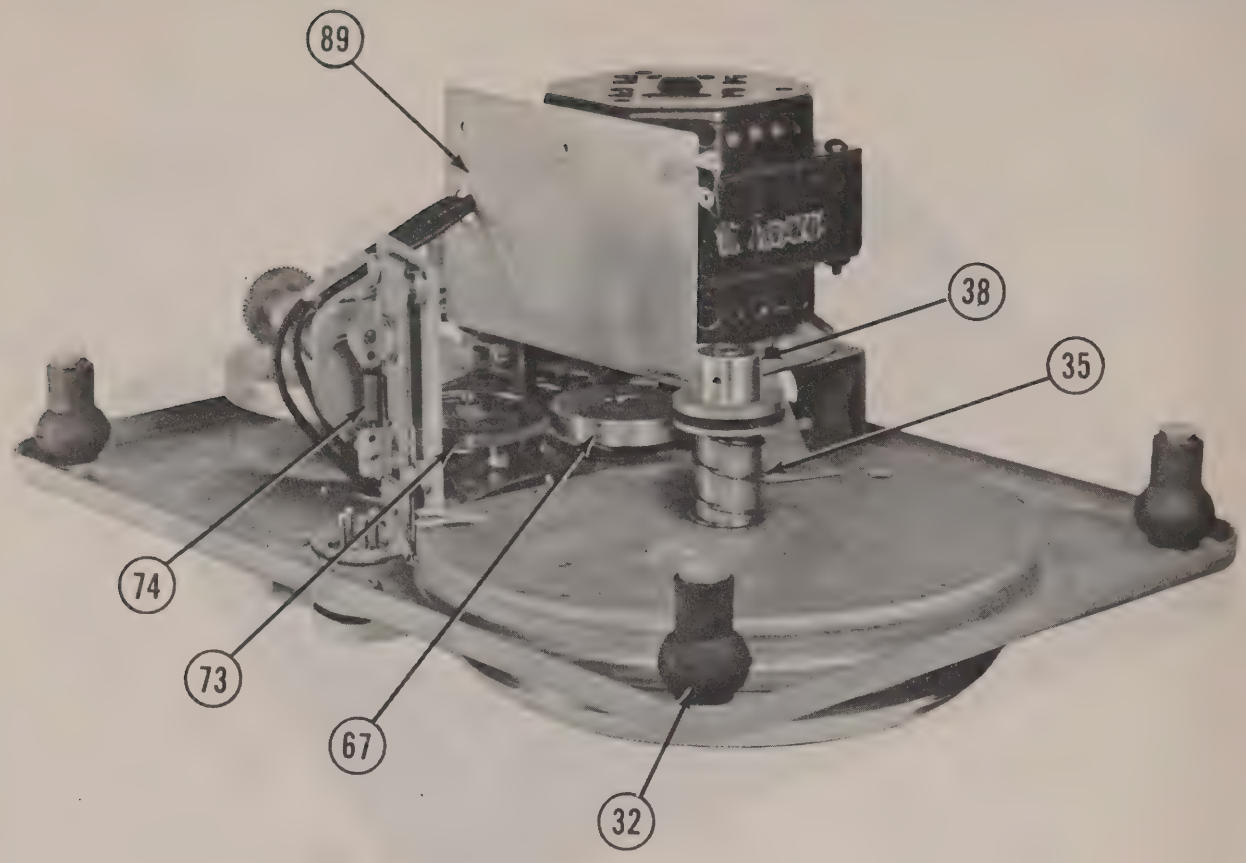
DATE 11/49 SET #77 FOLDER #4



BOTTOM VIEW—LEFT SIDE

OPERATION

Proper placing of the wire on the machine is very important, as "wows" may result from improper procedure.

Proceed as follows:

Press the "Reset" button.

Before placing the wire on the mechanism, the recording head should be brought to its top position. This may be done by turning the selector switch knob to "Rewind" and stopping the head at the top of its travel.

Place the spool, label side up, over the hub (10), and press on the storage spool until it is firmly seated.

Loosen the end of the tape leader from the spool and carefully pull it past the recorder head. Place the tape leader in the channel in the rim of the turntable.

While holding the leader against the inner edge of the channel, rotate the turntable by hand until two complete turns of wire are in the channel. The full length of the leader must be pressed against the inner surface of the channel or speed variations will result.

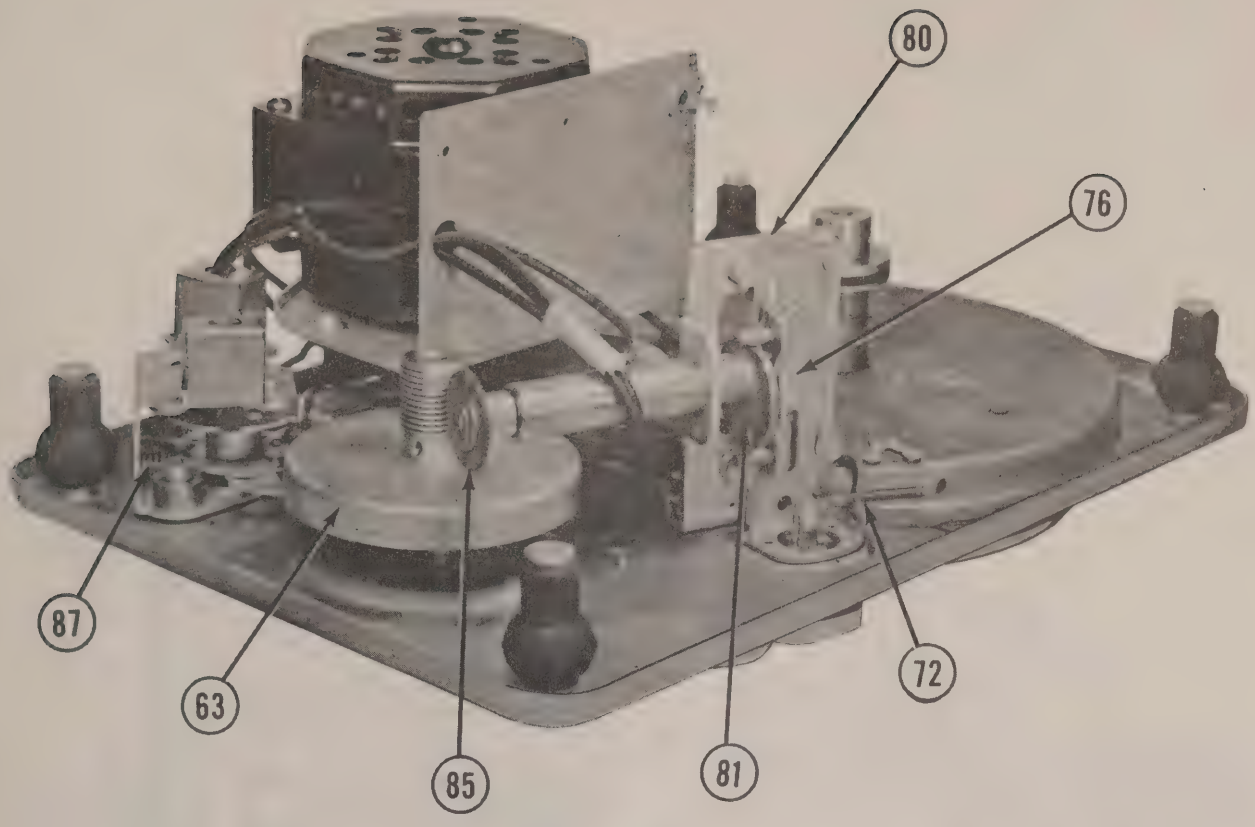
Press the "Reset" button (8) and turn the control knob (13) to "Play" or "Record" position, depending on which is to be accomplished. The mechanism will now play or record continuously for a length of time according to the size spool of wire in use.

If the recorder is not turned off manually, the tape leader which is fastened to the end of the wire passes under the switch housing (7) contacting the switch arm, thereby tripping the switch (21) shutting off the recorder automatically.

To rewind, place the tape leader in the channel of the storage spool and rotate the spool by hand until several turns of wire are in the channel. Turn the control knob to rewind and press the "Reset" button. The recorder will be shut off when the tape leader on the end of the wire contacts the switch arm of the automatic switch assembly.

The control knob (13) may be turned to any position, at any time without injury to the mechanism. When changing the position of the control switch, the knob should be snapped quickly from one position to the other. It is not necessary or advisable to touch the wire at any time.

To play records on the recorder, rewind the wire onto the spool. Turn the control knob to the "Off" position and press down on the "Reset." Place a record on the turntable; turn the control knob to the "Play" position; raise the pickup arm (1) from its



BOTTOM VIEW—RIGHT SIDE

rest, spring clip (27) used as tone arm rest when the unit is not in operation, swing arm over and set needle down in the starting groove on the right-hand side of the record. A boss (A.A.) on switch cover has been provided for resting the pickup arm in an out-of-the-way position while changing records. Allow the inside face of the tone arm to engage the boss (A.A.), then turn the control knob (13) to the "Off" position. However, when the user is finished with the unit as a record player or record recorder, the arm should be returned to a locked position on the rest spring (27). Turn the control knob to the "Off" position and remove the record.

MECHANICAL ALIGNMENT

Motor Adjustment

1. Loosen the motor plate mounting screws.
2. Remove the plug button (86).
3. Insert the adjusting tool (WT1-A) through the hole made by removal of the plug button and move the motor until the adjusting tool slides over the motor shaft.
4. Tighten the mounting screws and remove the tool.
5. Replace the plug button.

Cam and Gear Adjustments

1. Loosen the set screw (82) holding the cam (81).
2. Insert a .006" feeler gauge between the gear shoulder (85-A) and the shaft housing (80-A).
3. Push the cam (81) and the shaft and gear assembly (85) toward one another until all play is taken up.
4. Tighten the cam set screw and remove the feeler gauge.

Worm and Gear Adjustment

Hold the fiber gear (85-B) with one hand and rotate the rewind pulley (63) with the other. Check the clearance between the fiber gear and worm of the rewind pulley (63) at least every 90° rotation of the fiber gear. The clearance should be as little as possible without causing drag or binding.

Make adjustment as follows:

1. Remove the switch housing (7).
2. Loosen the mounting screws (24) of the level wind frame (80) about ¼ to ½ turn.
3. Move the entire assembly until the proper adjustment is made.
4. Tighten the mounting screws.
5. Rotate the rewind hub (10) so the slide assembly will go through its entire stroke to be sure the recording head (23) does not bind on the edge of the hole in the mounting board.

A PHOTOFACT "EXPLODED" VIEW

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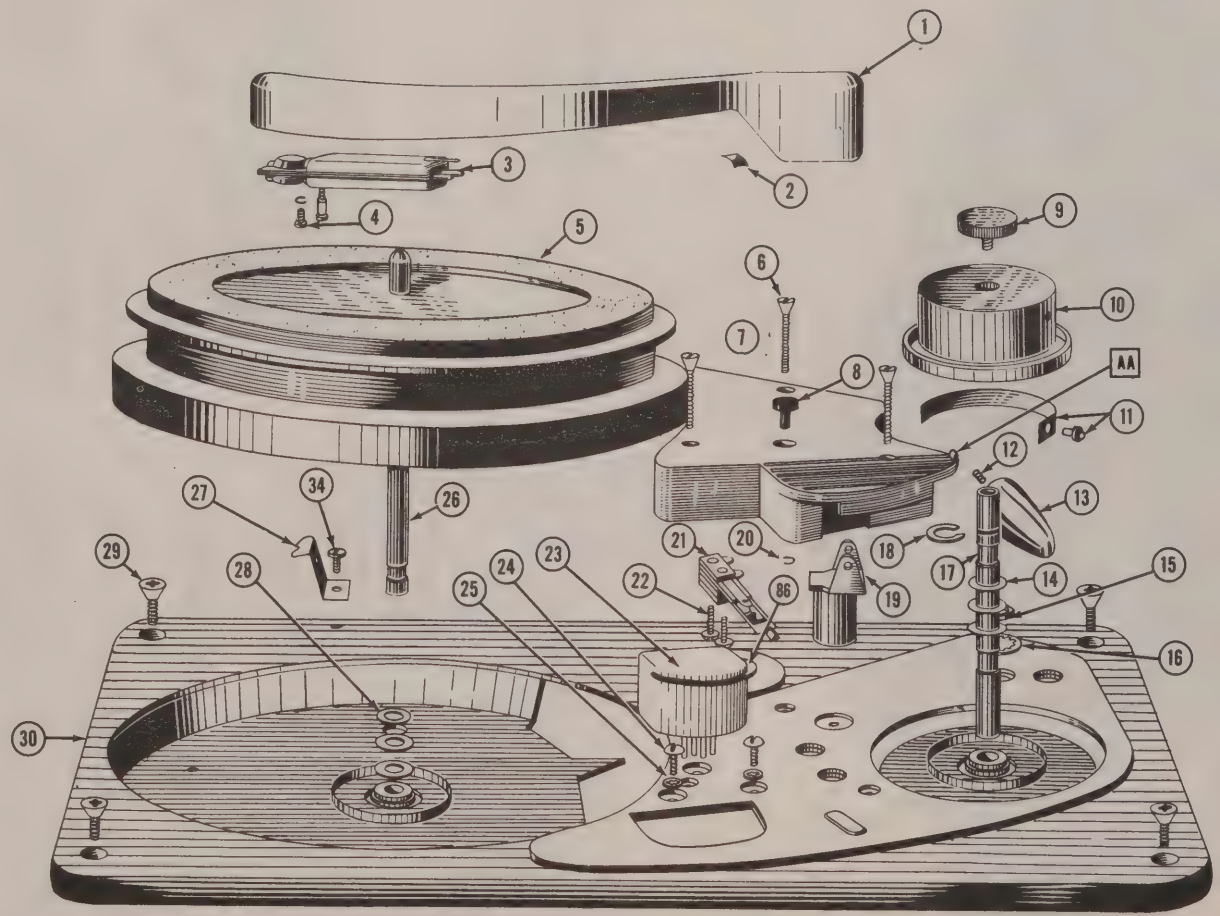
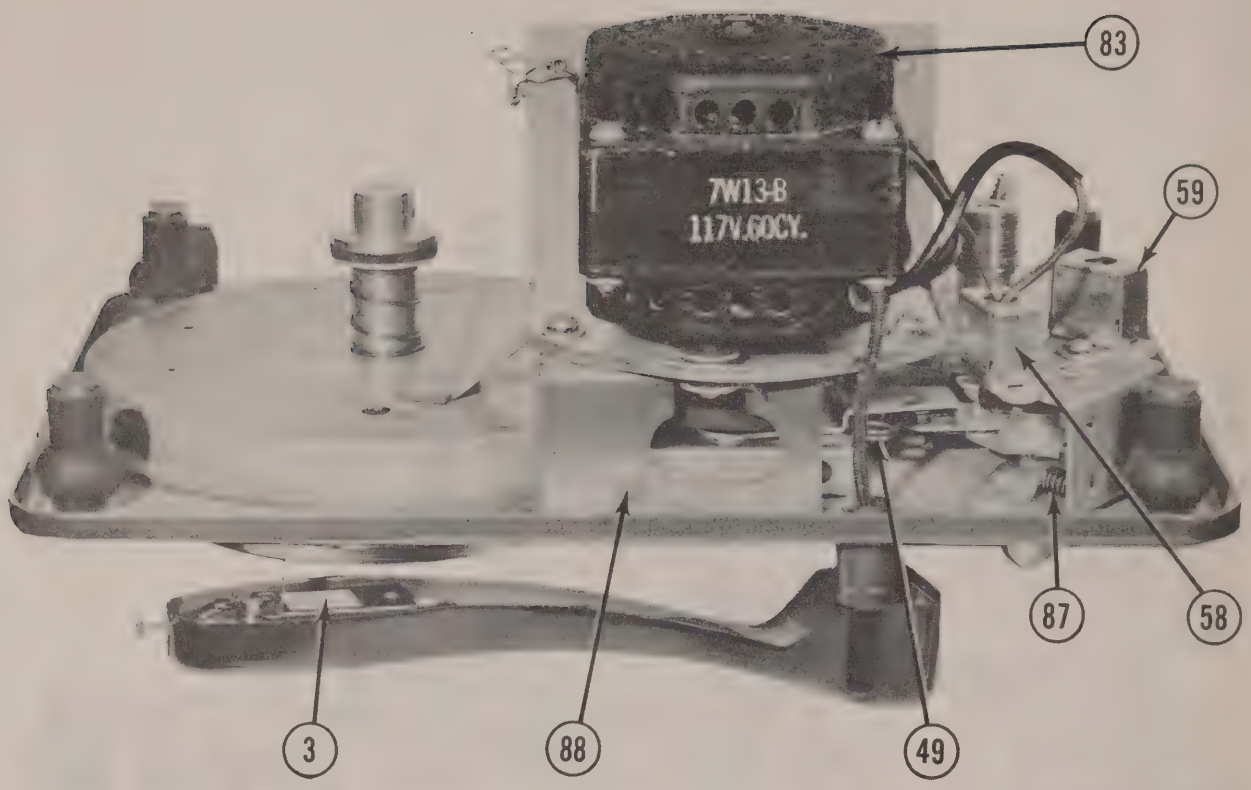


SEE NOTE NO.1
NOTE NO.1
REFERENCE NO.'S 60, 61, 62
ARE NOT USED ON SOME MACHINES



BOTTOM VIEW—REAR

6. Replace the switch housing.

Turntable Torque Adjustment

Proper adjustment of the turntable torque is very important. Insufficient torque will result in inconsistent turntable speed, causing "wow." Too much torque will result in wire breakage when switching from rewind to play.

1. With the power connected, turn the control knob to the "Play" position.

2. Loosen the locknut on the adjustment screw (88) in the motor mounting bracket (44).

3. If the turntable does not rotate, turn the adjustment screw counterclockwise until the idler drive pulley (41) barely makes contact with the turntable but enough to allow the turntable to rotate.

4. If the turntable is rotating, turn the screw clockwise until the turntable stops rotating; then back the screw out until the idler drive pulley barely makes contact with the turntable but enough to allow the turntable to rotate.

5. After this adjustment is made, turn the adjustment screw counterclockwise ¾ turn.

6. Tighten the locknut, being careful not to turn the adjustment screw.

Level Wind Adjustment

1. Rotate the rewind hub (10) until the recording head (23) is in its extreme downward position. In this position, the wire slot in the recording head should be approximately .020" above the motor board (30). If the wire is too high or too low, with respect to the motor board, it may be adjusted by slight bending of the level wind slide (76).

2. The reset switch arm which is fastened to the top of the switch housing (7) should be 15/32" from the motor board. This may be adjusted by bending the arm.

3. Thread on a spool of wire and let it wind on the turntable for 15 or 20 minutes. Observe how the wire lies in the channel of the turntable. With the proper adjustment, the wire should be even all the way across the channel. If the wire piles up in the top of the channel of the turntable, remove the turntable and add washers (28) until the condition is corrected. If the wire piles up in the bottom of the channel, washers should be removed.

4. Rewind the wire on the storage spool and observe how the wire lies on the spool. If the wire piles up on the top of the spool, remove the hub assembly and add washers (14) until this condition is corrected. If the wire piles up on the bottom of the spool, washers should be removed.

Rewind Spindle Assembly End Play

1. Remove the hub lock screw (9) and lift off the rewind hub.

2. Loosen the set screw (64) in the pulley assembly (63).

3. Place a .006" feeler gauge between the thrust washer (14) and the end of the bearing on the motor board.

4. Hold the top of the rewind shaft against the feeler gauge and press up on the rewind pulley until all end play is removed.

5. Tighten the set screw and remove the feeler gauge.

Turntable Assembly End Play

1. Loosen the set screw (39).

2. Push the felt washer (37) and the keyed washer (36) up out of the way.

3. Place a .006" feeler gauge between the turntable support (38) and the end of the bearing.

4. Push down on the turntable assembly (5) and up on the turntable support (38) until all end play is removed.

5. Tighten the set screw (39) and remove the gauge.

Selector Switch Toggle Action

Check the toggle action by moving the control knob (13) slowly from "Play" to "Rewind" position, and back, and observe the action of the selector switch (50). The toggle action should snap the bracket and post assembly (40) with a positive and even action to each position.

To adjust the toggle action:

1. Turn the control knob to the "Rewind" position.

2. Hold the drive control spring (49) with pliers, and loosen the set screw (56) in the arm and link assembly (57).

3. Moving the adjustment toward the rewind pulley (63) gives more positive action when switching to the "Rewind" position.

4. Moving the adjustment toward the switch assembly (50) gives more positive action when switching to "Play" position.

5. Normally, the position should be midway in the adjustment range.

6. Tighten the set screw and check the adjustment.

LUBRICATION

Factory lubrication should be sufficient for a long period of service; however, should it become necessary to lubricate the recorder, do so as follows:

Use Sta-Put No. 512 grease on the following:

1. Pins of the bracket and post assembly (40).

2. Washers (42), one of which is located on top of the bracket and post assembly (40).

3. Bearing surfaces of the drive control spring (49).

4. All moving parts of the switch assembly (50).

5. The worm gear of the rewind pulley assembly (63).

6. The shaft, of the level wind shaft and gear assembly (85); also bearing faces.

7. Level wind guides, of the frame and housing assembly (80).

8. Follower assembly (75).

Use Sta-Put No. 320 Oil on the following:

1. Turntable shaft (26).

2. Shaft assembly (17).

3. The cam surface of the level wind cam (81).

CAUTION: All Pressed Oilite Bearings do not require oil.

Do not, under any circumstances, permit oil or grease to come in contact with the rubber tires of the idler pulleys and drive pulley; the turntable rim; pulley (67), and the rewind pulley (63). If grease and oil are on the rubber tires, replace them with new ones and clean the other surfaces with carbon tetrachloride.

Avoid overlubrication.

CLEANING OF THE RECORDING HEAD

Weak reproduction, when not accompanied by high distortion, is probably due to dirt or foreign matter in the recording gap. Clean the gap with a stiff-bristle brush.

CAUTION: Do not use any metallic object for this purpose.

SERVICE PARTS LIST FOR CRESCENT WIRE RECORDER MECHANISMS

MODELS C-1000 SERIES and M-1000 SERIES

USE PART NUMBERS WHEN ORDERING

REFERENCE NUMBERS REFER ONLY TO EXPLODED VIEW ON PAGES 4 AND 5 IN SERVICE MANUAL

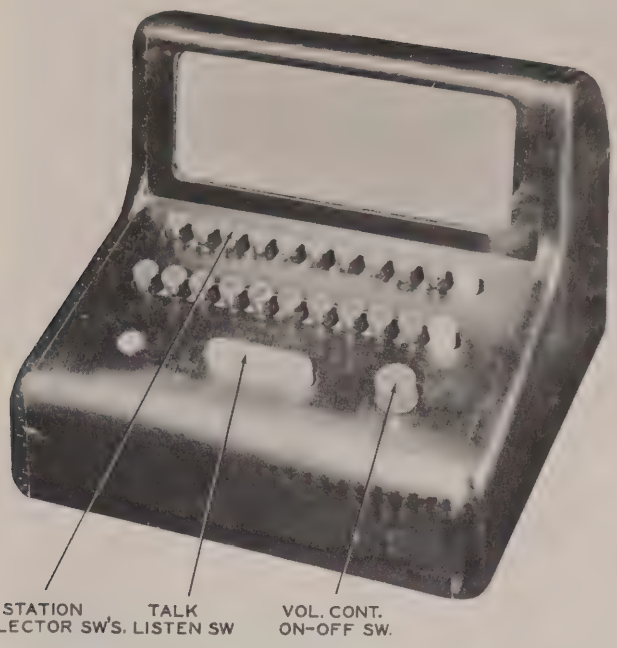
Ref. No.	Part No.	DESCRIPTION
1	WR21-B	Pickup arm and pivot spring assembly (used on CWR30 & E1000 series)
	WR50	Pickup arm and pivot spring assembly (used on C1000 & M1000 series)
2	4W13-A	Spring clip (used on CWR30 & E1000 series)
	4W16	Spring clip (used on C1000 & M1000 series)
3	7W45-A-1	Pickup cartridge—P-92B Shure Bros.
	7W45-A-2	Pickup cartridge—L-70 Astatic
	8W202	Pickup cartridge—P-30S Shure Bros.
	7W29-A	Phono lead
	6W13-A	Needle screw for pickup cartridge
4	6W7-A	Screw (4-40 x 1/4 R.H.M.S.)
5	WR28-B	Turntable assembly (including Ref. No. 26)
6	6W6-A	Screw (6-32 x 1 Phillips Head M.S.)
	WR27-B	Automatic switch assembly (including Ref. Nos. 7, 8, 20, 21, and 22; also the following parts not identified by a reference number)
	WR35-A	Switch bracket and arm assembly (part of auto. switch assembly)
	2W41-A	Switch bushing (part of auto. switch assembly)
	1W14-A	Switch cover (part of auto. switch assembly)
7	3W2-C	Switch housing (part of auto. switch assembly)
8	3W4-A	Switch button (part of auto. switch assembly)
9	2W9-A	Hub lock screw (part of rewind spool hub assembly)
10	WR11-A	Rewind spool hub assembly (including Ref. Nos. 9, 10, 11, and 17)
11	4W6-A	Hub spring (part of rewind spool assembly)
	2W20-A	Hub insert (part of rewind spool assembly)
12	6W1-A	Screw (8-32 x 1/8 Allen Head M.S.)
13	3W5-A	Control knob
14	5W4-A	Fiber washer
15	7W15-A	Hex nut (3/8-32)
16	5W15-A	Lockwasher (3/8" I.T.)
17	WR20	Shaft assembly (part of rewind spool hub assembly)
18	5W3-A	Hub thrust washer
19	1W20-A	Arm support bracket (part of 30)
20	4W11-A	Retaining spring (part of auto. switch assembly)
21	WR22-A	Automatic switch (part of auto. switch assembly)
22	6W11-A	Screw (6-32 x 1/2 R.H.M.S.) (part of auto. switch assembly)
23*	WR37-C	Recording head (Crescent) (Identify by—metal shield on top only) (Manufacturer's model with 4 prong plug)
	WR45-C	Recording head (Crescent) (Identify by—metal shield on top only) (Distributor's model with 5 prong plug)
	7W36-C	Recording head spacer (used on Crescent head only)
*	7W28-C	Recording head (St. George) (Identify by—no metal shields and two ridges on top of head)
*	7W20-C	Recording head (Lear) (Identify by—metal shield on top and bottom)
24	6W5-A	Screw (8-32 x 3/8 R.H.M.S.)
25	5W13	Lockwasher (No. 8 I.T.)
26	2W43-A	Turntable shaft (part of Ref. No. 5)
27	3W6-A	Pickup arm rest. Plastic Type (used on CRW30 & E1000 series)
	1W37-A	Pickup arm rest. Spring Clip Type (used on C1000 & M1000 series)
28	5W4-A	Fiber washer
29	6W9-A	Screw (10-32 x 1/2 Phillips flat head)
30	WR38-A	Mounting board assembly (including Ref. 19)
31	5W16-A	Flat washer
32	7W18-A	Rubber mount
33	2W44-A	Mounting stud
34	6W10	Screw (pickup arm rest) (No. 6 x 3/8 S.M.S.) (used on CWR30 & E1000 Series)
	6W14	Screw (6-32 x 3/8 R.H.M.S.)
34A	7W51	Nut (6-32) (used on C1000 and M1000 series)
35	4W5-A	Turntable spring
36	5W2-A	Keyed washer
37	5W1-A	Felt washer (turntable)
38	2W12-A	Turntable support
39	6W1-A	Set screw (8-32 x 1/8 Allen head)
40	WR15-A	Bracket and post assembly
14	WR9-B	Idler drive pulley
42	5W11-A	Flat washer
43	WR14-A	Drive link assembly
44	1W24-B	Motor mounting bracket (0art of 30)
45	7W10-A	Retainer ring
46	WR10-B	Motor drive pulley
47	WR12-A	Rewind link assembly
48	5W8-A	Friction washer
49	4W3-A	Drive control spring
50	WR2-B	Switch assembly (including 51, 52, 53 and 87)
51	WR3-A	Record button assembly (part of 50)
52	WR6-A	Cam lever assembly (part of 50)
53	WR5-A	Switch lever assembly (part of 50)
54	4W9-A	Retainer spring
55	5W6	Lockwasher (No. 6 I.T.)
56	6W8	Adjusting screw (6-32 x 5/32 R.H.M.S.)
57	WR18-A	Arm and link assembly
58	WR7-A	On-off switch assembly
59	WR8-A	On-off switch assembly
60**	4W4-A	Rewind pulley spring
61**	5W2-A	Keyed washer
62**	5W19-A	Felt washer (rewind)
63	WR26-A	Rewind pulley assembly
64	6W1-A	Set screw (8-32 x 1/8 Allen Head)
65	4W12-A	Coil spring
66	WR13-A	Rewind link assembly
67	WR19-A	Pulley and bushing assembly
68	5W7-A	Cloth washer
69	7W9-A	Spring clip
70	6W3-A	Motor mounting screw (8-32 x 5/8 R.H.M.S.)
71	6W7-A	Screw (4-40 x 1/4 R.H.M.S.)
72	4W8-A	Level wind spring
73	WR9-B	Idler drive pulley
74	4W7-A	Tension spring
75	WR33-A	Follower assembly (part of 76)
76	WR31-A	Level wind slide assembly
77	7W19-A	Rubber grommet
78	1W8-A	Solder lug
79	7W2-A	Rivet
80	WR36-A	Level wind frame and housing assembly
81	3W7-A	Level wind cam
82	6W1-A	Set screw (8-32 x 1/4 Allen Head)
83	7W13-B-1	Motor, complete; 105-125 volts, 60 cycles (Motor 7W13-B-1 and 7W13-B-2 are interchangeable)
	7W13-B-2	
	7W31-B-1	Motor, complete; 220 volts, 60 cycles (Motor 7W31-B-1 and 7W31-B-2 are interchangeable)
	7W31-B-2	
	7W32-B-1	Motor, complete; 105-125 volts, 50 cycles (Motor 7W31-B-1 and 7W32-B-2 are interchangeable). (WR-60—Bushing and Set Screw Assembly must be used on 50 cycle Motors)
	7W32-B-2	
	7W33-B-1	Motor, complete; 220 volts, 50 cycles (Motor 7W33-B-1 and 7W33-B-2 are interchangeable). (WR-60—Bushing and Set Screw Assembly must be used on 50 cycle motors)
	7W33-B-2	
84	5W8-A	Friction washer
85	WR32-A	Level wind shaft and gear assembly
86	2W45-A	Plug button
87	4W2-A	Compression spring (part of 50)
88	6W3-A	Adjusting screw (8-32 x 5/8 R.H.M.S.)
89	1W22-B	Motor plate
90	5W5-A	Flat washer
91	5W17-A	Flat washer
92	WR-60	Bushing and Set Screw Assembly (used for 50 cycle operation).
	WT1-A	Motor Alignment Tool

*It is recommended that recording heads be returned to a Crescent distributor for identification, to insure proper replacement.

When ordering parts that have an enamel finish, the color should be specified, to insure proper replacement.

**Reference numbers 60, 61, and 62 are not used on some machines.

Prices subject to changes without notice.



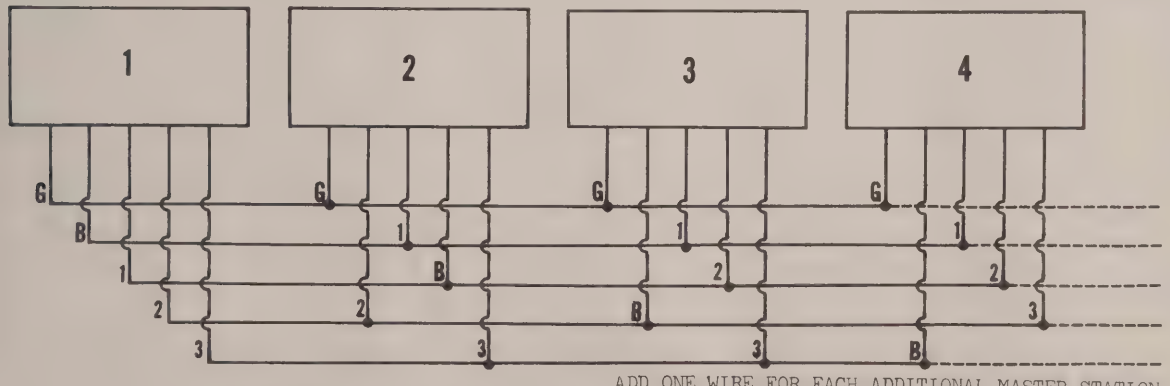
TRADE NAME	David Bogen, Models 11D, 21D
MANUFACTURER	David Bogen Co., Inc., 663 Broadway, New York 12, New York
TYPE SET	AC-DC Operated Intercommunication System
TUBES (TWO)	Types 14F7 AF Amp., 50L6GT Power Output
POWER SUPPLY	110-120 Volts AC RATING: .25 Amp. @ 117 Volts AC

SINGLE MASTER SYSTEM

Any number of remotes up to ten for the model 11D and twenty for the model 21D may be used in this system. Connect the common lead from the remotes to "G" on the master. On remotes having "Break-In", connect the "Break-In" lead to "BR" on the master. The other lead from each remote then connects to the individual numbers on the master from 1 up to the number of remotes used.

MULTIPLE MASTER SYSTEM

Any number of masters up to eleven for the model 11D and twenty one for model 21D may be connected in this system. First modify each master by removing the bottom plate and cutting the two orange leads on the Press-To-Talk switch (See schematic). Tape the ends of the cut wires and replace the bottom plate. Use an interconnecting cable having one lead less than the number of masters being used. Connections are made as shown below.



ADD ONE WIRE FOR EACH ADDITIONAL MASTER STATION

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PARTS LIST AND DESCRIPTIONS

DAVID BOGEN
MODEL 11D

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		DAVID BOGEN PART No.	STANDARD REPLACEMENT		
V1	AF Amp.	14F7	14F7	8AC	
V2	Power Output	50L6GT	50L6GT	7AC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	DAVID BOGEN PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	40	150		AF844D	UP43215		EL-224	■ Filter
B	30	150						▲ Filter
C	10	150						Filter
C2	10	25		PRS25/10	BR102A		TVA-5	Output Cathode Bypass
C3	500	500		1468-005	5W5T5	GP2K-500	1FM-35	Audio Coupling
C4	.001	600		P688-001	GT6D1	GP2L-001	TM-21	Audio Coupling
C5	.01	600		P688-01	GT6S1		TM-11	Output Plate Bypass
C6	.1	400		P488-1	GT4P1		TM-1	Line Isolation
C7	.005	600		P688-005	GT6D5	GP2M-005	TM-25	Audio Coupling - See Note

Note. Not used in all models.

CONTROLS

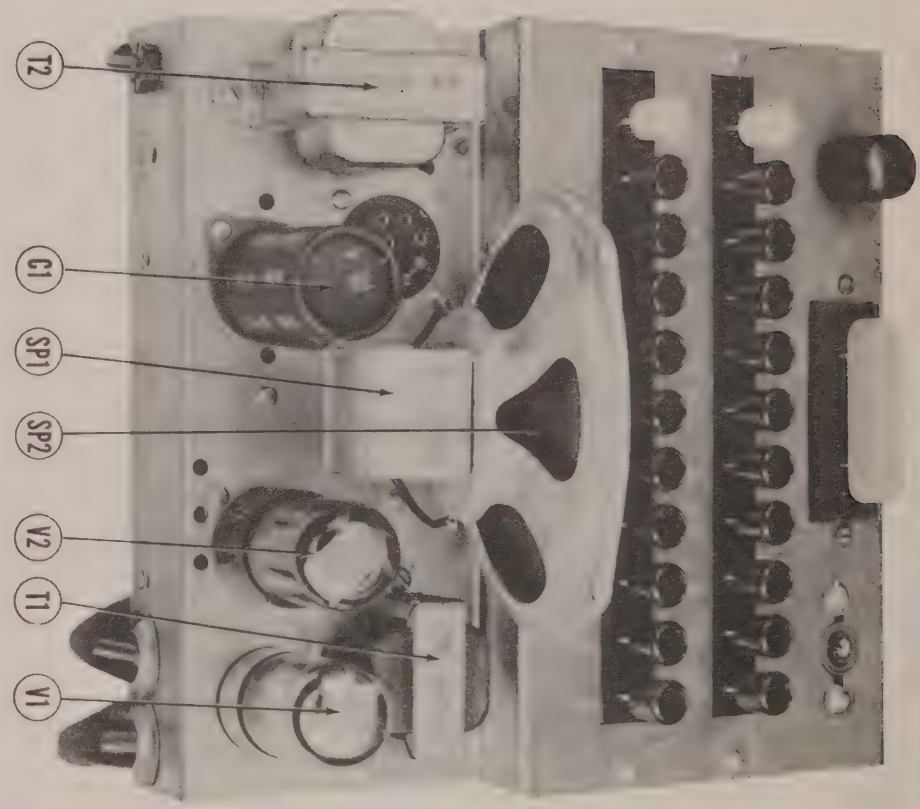
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	DAVID BOGEN PART No.	IRC PART No.	CLAROSTAT PART No.	
R1	25Ω	2	V276		43S-25*	Volume Control and Switch (Wire Wound)

* Switch attached at factory.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	DAVID BOGEN PART No.	IRC PART No.	
R2	33KΩ	½		BTS-33K	AF Grid
R3	3300Ω	½		BTS-3300	AF Cathode
R4	220KΩ	½		BTS-220K	AF Plate
R5	470KΩ	½		BTS-470K	AF Grid
R6	2200Ω	½		BTS-2200	AF Cathode
R7	100KΩ	½		BTS-100K	AF Plate
R8	470KΩ	2		BTS-470K	Output Grid
R9	150Ω	½		BW-½-150	Output Cathode (Wire Wound)
R10	3300Ω	½		BTS-3300	Filter
R11	220Ω	½		BW-½-220	Filter (Wire Wound)
R12	68Ω	½			Surge Limiter (Wire Wound)
R13	370Ω	10			Line Dropping (Wire Wound)
R14	47KΩ	½		BTS-47K	Series Neon
R15	47KΩ	½		BTS-47K	Series Neon
R16	100Ω	½		BW-½-100	Isolation (Wire Wound)
R17	68Ω	½		BW-½-68	Input Transformer Shunt (Wire Wound)
R18	5.1Ω	½			Input Transformer Shunt (Wire Wound)
R19	470Ω	½		BTS-470	Tone Compensation

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RATING			REPLACEMENT DATA				INSTALLATION NOTES
	TURNS RATIO	DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI. to SEC.	PRI.	SEC.					
T1	1 to 22	.9Ω	1300Ω	T110BU	A-4744	A-2938†	RO-18 †	† Connect in reverse.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		DAVID BOGEN PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T2	1500Ω	3Ω	90Ω	.5Ω	T252BU	A-3849	A-2902	RO-2 ‡	‡ Drill New Mtg. Hole.

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			DAVID BOGEN PART No.	JENSEN PART No.	QUAM PART No.	
SP1	FIELD	V.C. IMP.		ST-105 Model P5-X	5A07	
	PM	3Ω				
SP2	CONE DIA	V.C. DIA.				
	4 1/2"	9/16"				

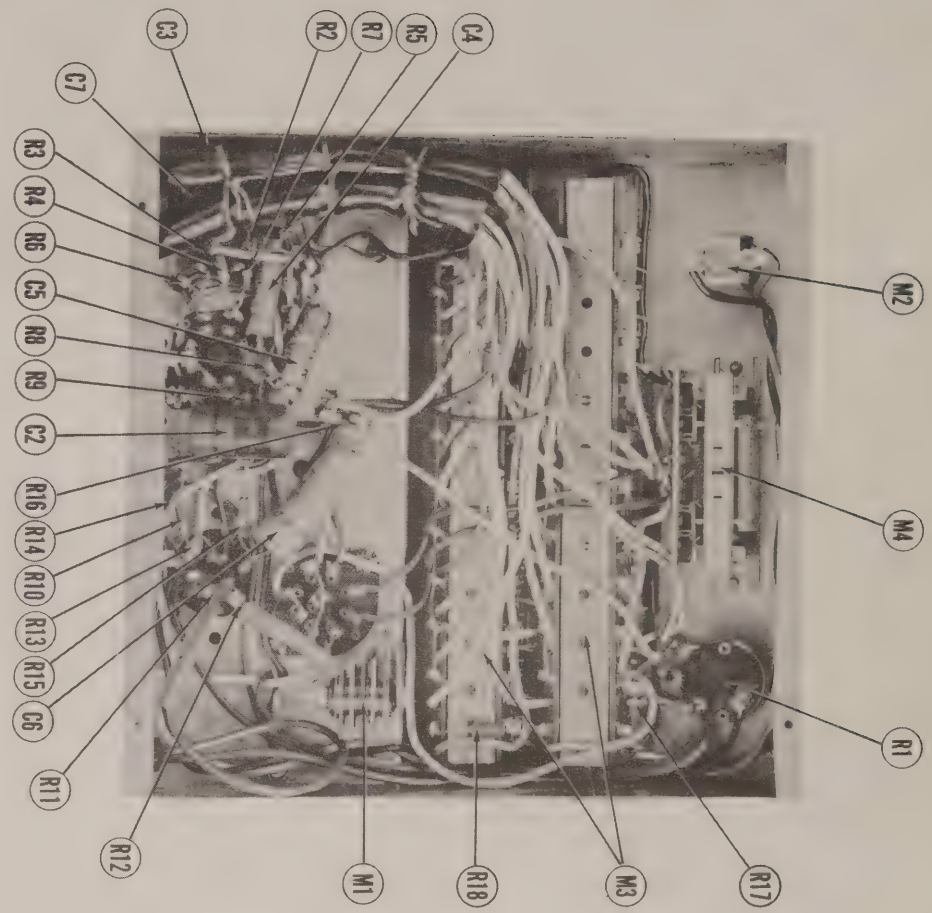
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	DAVID BOGEN PART No.	SYLVANIA PART No.		
M1	.060Amp.		NB-5		

MISCELLANEOUS

ITEM No.	PART NAME	DAVID BOGEN PART No.	NOTES
M2	Lamp		Neon NE51
M3	Switch		Pushbutton
M4	Switch		Talk - Listen

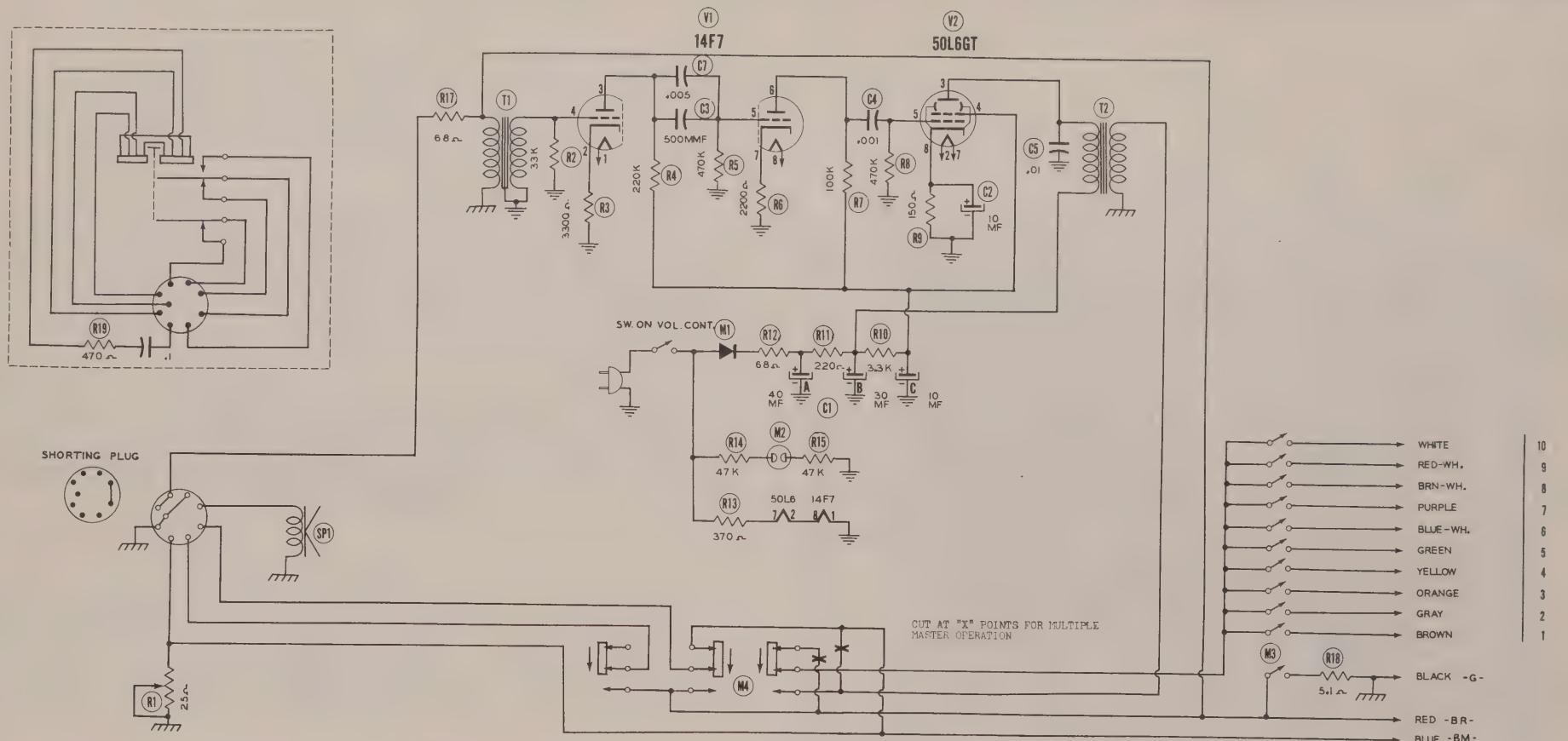
CHASSIS—BOTTOM VIEW



DATE 11/49 SET #77 FOLDER 5

DAVID BOGEN MODEL 11D

DAVID BOGEN MODEL 11D



VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	14F7	0V	.7VDC	4.5VDC	0V	0V	65VDC	.8VDC	12VAC
V 2	50L6GT	0V	12VAC	115VDC	105VDC	0V	0V	58VAC	6.9VDC

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	14F7	0Ω	3.3KΩ	†220KΩ	1.5KΩ	470KΩ	†100KΩ	2.2KΩ	15Ω
V 2	50L6GT	Inf.	15Ω	†350Ω	†3.5KΩ	500KΩ	0Ω	70Ω	150Ω

† Measured from output of M1.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

MOTOROLA MODELS
VK-106, 107, 10VK9, 10VT3, 12VK18B, R, 12VT16, B, R

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

MODEL 12VT16R

MOTOROLA MODELS
VK-106, 107, 10VK9, 10VT3,
12VK18B, R, 12VT16, B, R

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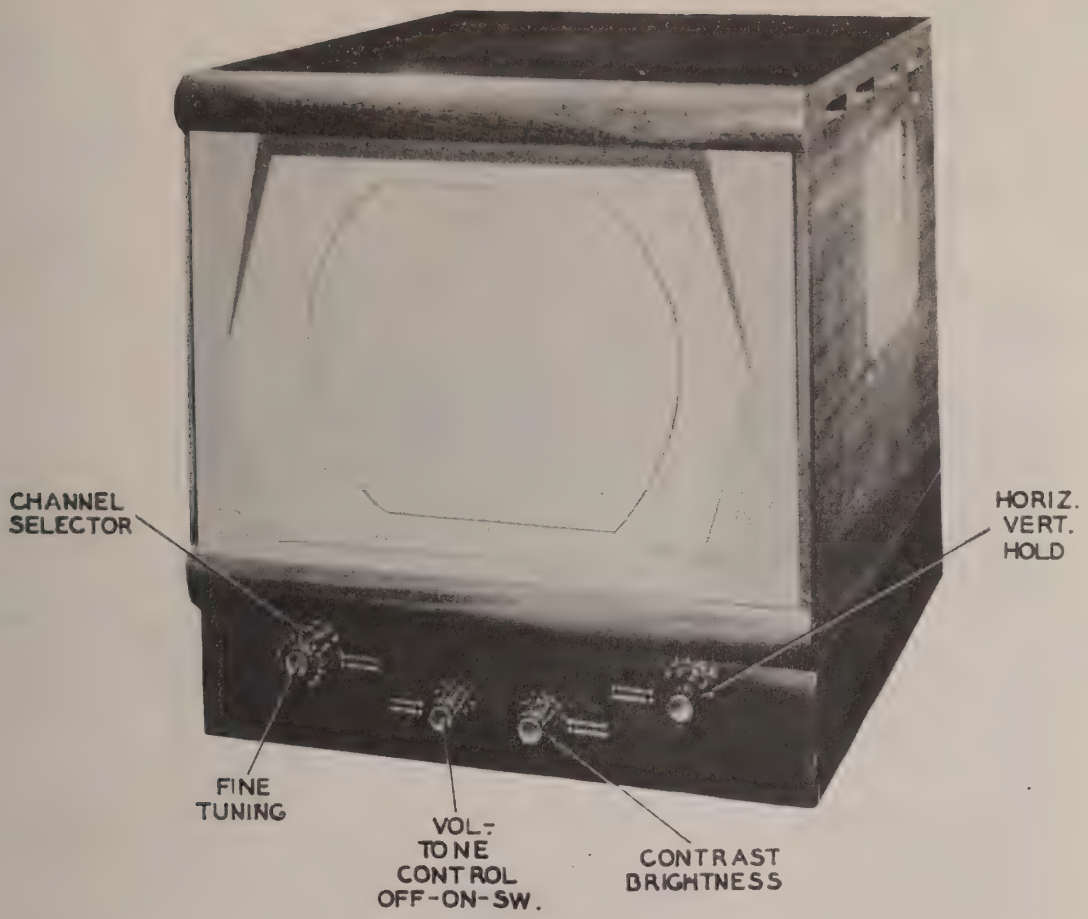
Date 11/49 Set No. 77—Folder No. 6

PHOTOFACT* Folder

MOTOROLA MODELS VK-106, 107, 10VK9, 10VT3, 12VK18B, R, 12VT16, B, R



MOTOROLA MODELS VK-106, 107, 10VK9, 10VT3, 12VK18B, R, 12VT16, B, R

TRADE NAME	Motorola Models VK106, VK107 (Ch. TS-9E), 10VK9, 10VT3 (Ch. TS-9E, TS-9E1), 12VK18B, 12VK18R, 12VT16, 12VT16B, 12VT16R (Ch. TS-15C, TS-15C1)
MANUFACTURER	Motorola, Inc., 4545 Augusta Blvd., Chicago 51, Illinois
TYPE SET	TV Receiver
TUBES	Twenty Four
POWER SUPPLY	110-120 Volts AC-60 Cycles
TUNING RANGE	Channels 2 thru 13 — RATING: 2.2 Amp. @ 117 Volts AC

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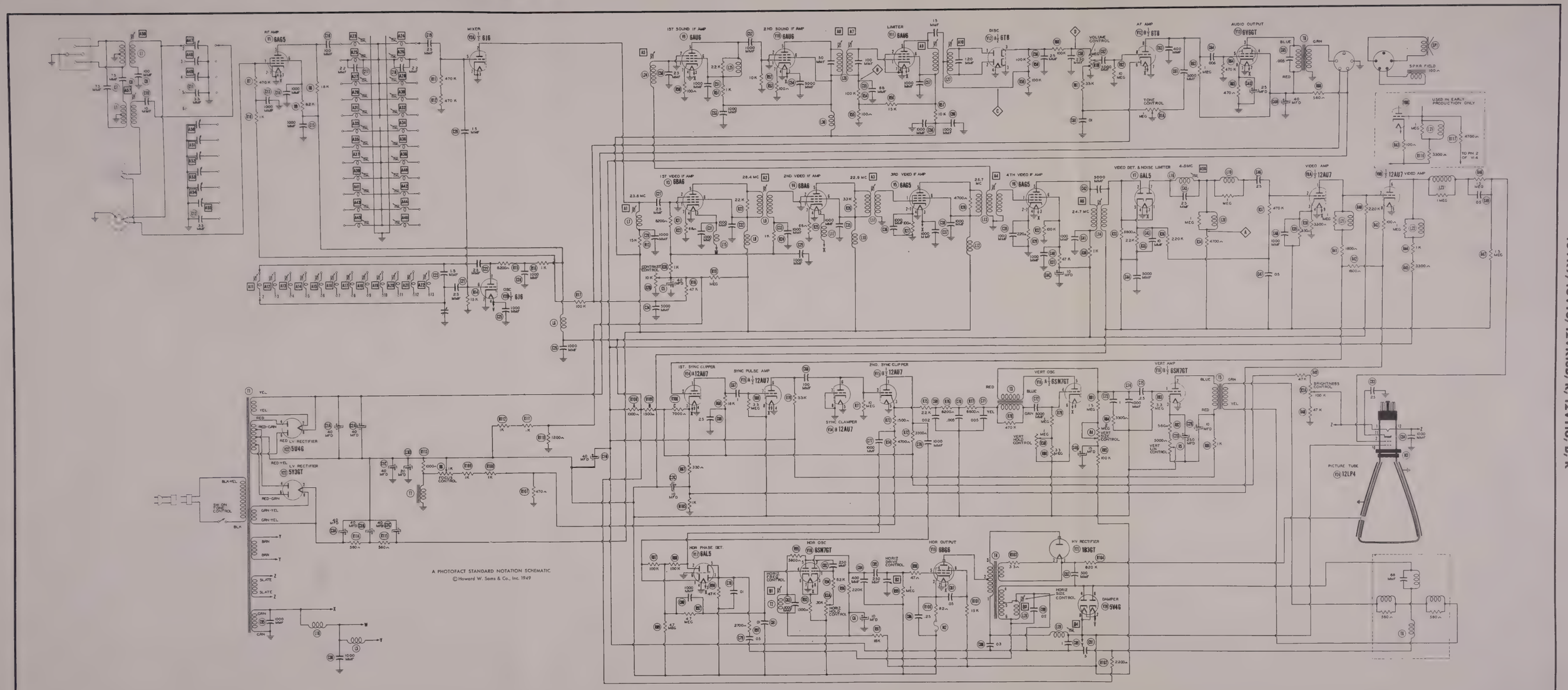
DATE 11/49 SET #77 FOLDER #6



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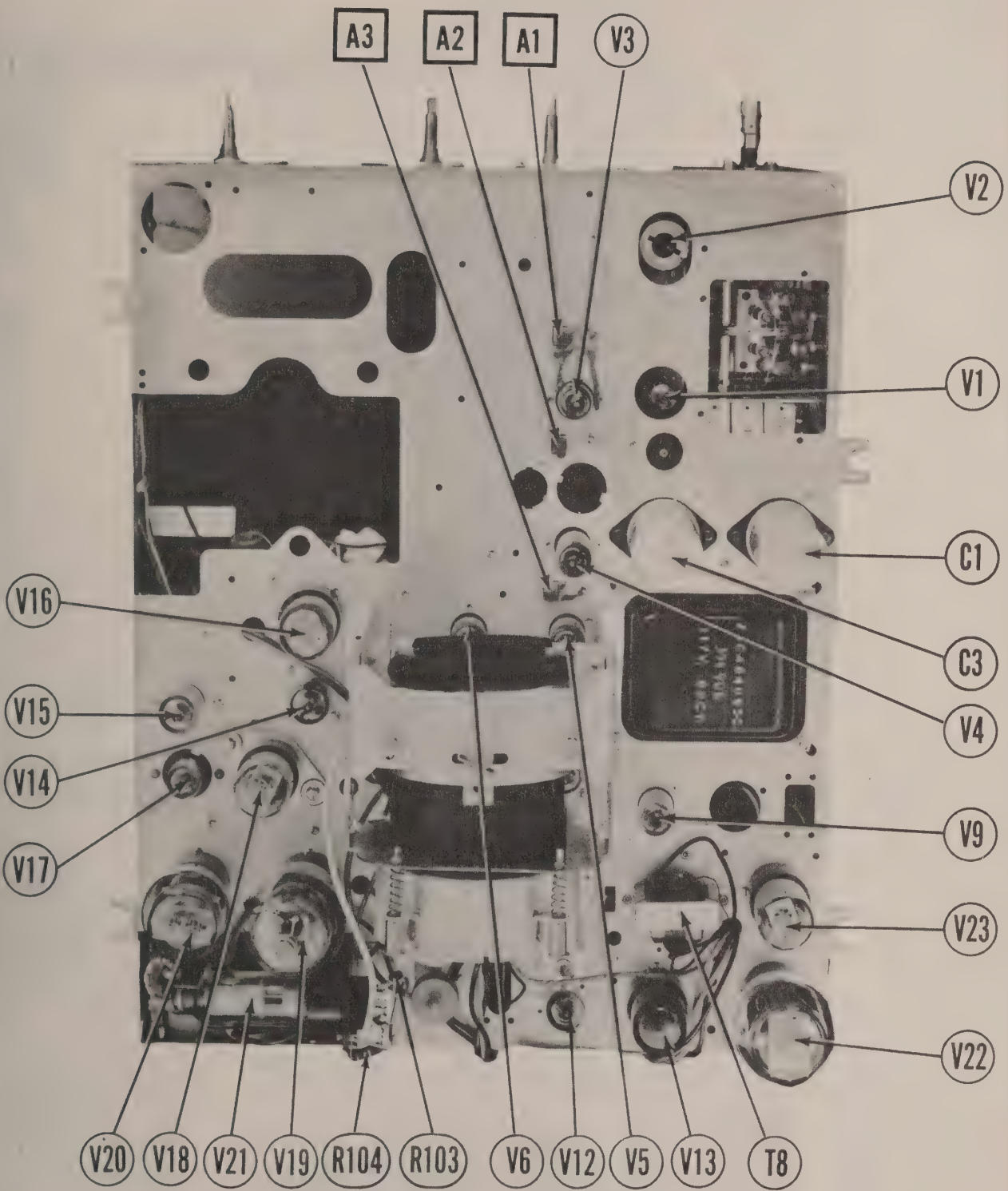
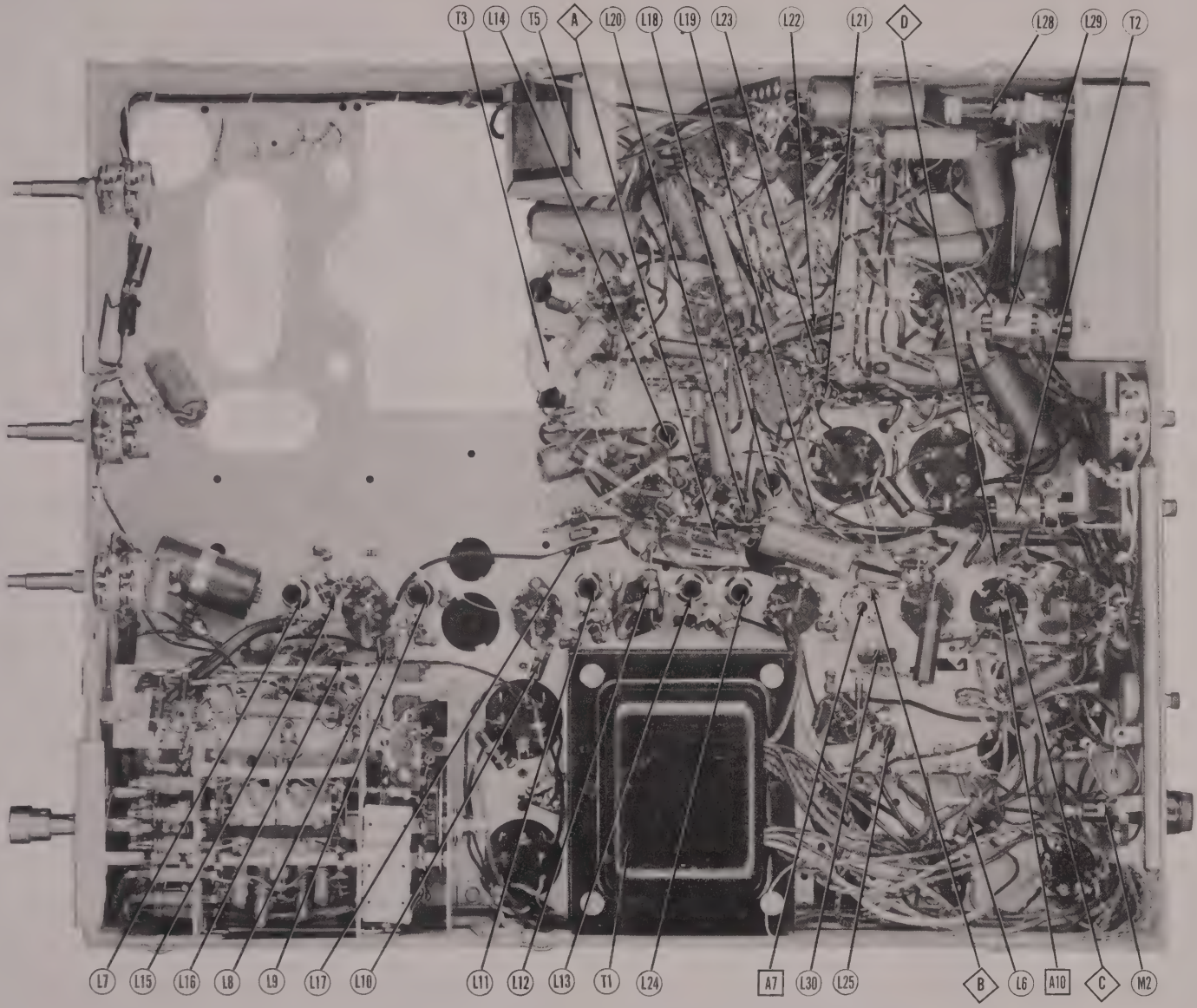
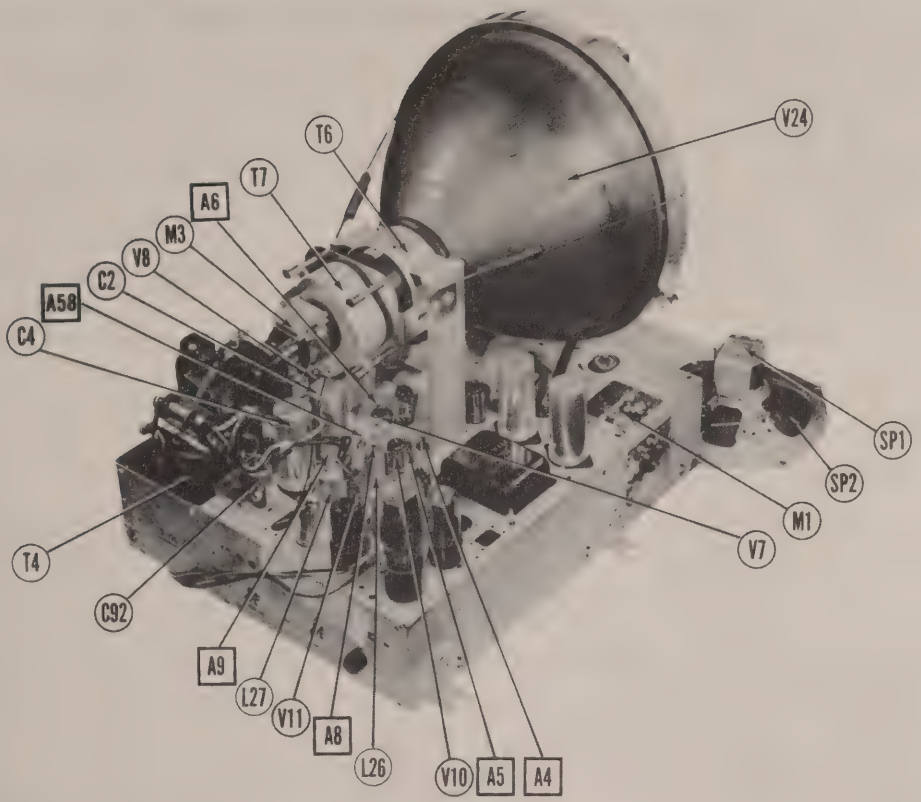
10VK9, 10VT3, 12VK18B, R, 12VT16, B, R



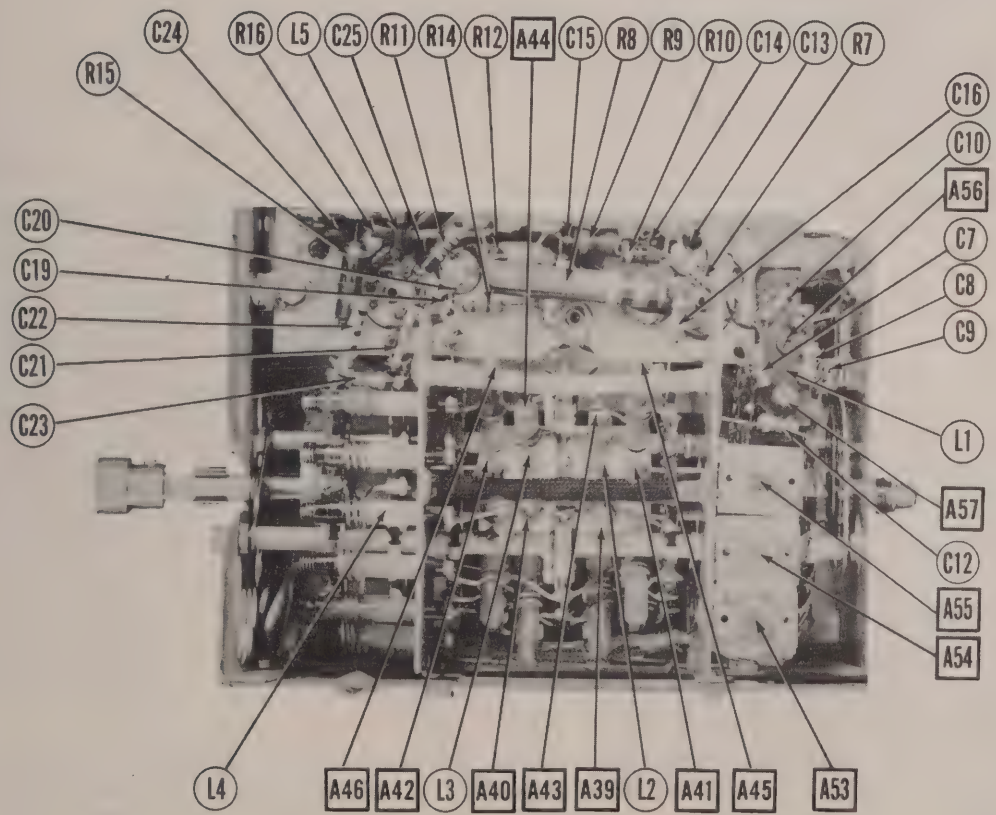
CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION



CHASSIS-TOP VIEW



RF TUNER-BOTTOM VIEW

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

It is necessary to remove the picture tube during alignment.
Remove the horizontal oscillator tube V18 to eliminate the high voltage shock hazard.
During alignment, avoid contact with the electrolytic capacitor cans as they are not at chassis potential.

VIDEO IF ALIGNMENT

Turn the channel selector switch to one of the blank positions between channel 2 and channel 13. This disables the local oscillator to prevent erroneous indications.

Turn the contrast control read -5 volts between the arm (center terminal) and chassis.

Connect the negative lead of a 3 volt battery to the junction of R11 and R12 and the positive lead to chassis.

The alignment frequencies for chassis TS-9E1 and TS-15C1 are different from the frequencies used for the TS-9E and TS-15C. Both frequencies are given in the signal generator frequency column and are identified as follows-† for chassis TS-9E and TS-15C and * for chassis TS-9E1 and TS-15C1.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	26.6MC † 23.4MC * (Unmod.)	See note above	DC Probe to Point (A) Common to B-.	A1	Adjust for maximum deflection.
2.	.01MFD	"	26.4MC † 22.9MC * (Unmod.)	"	"	A2	"
3.	.01MFD	"	22.9MC † 26.7MC * (Unmod.)	"	"	A3	"
4.	.01MFD	"	25.7MC † 25.5MC * (Unmod.)	"	"	A4	"
5.	.01MFD	"	21.7MC (Unmod.) maximum output.	"	"	A5	Adjust for MINIMUM deflection. Repeat step 4.
6.	.01MFD	"	24.7MC (Unmod.)	"	"	A6	Adjust for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

See instructions under Video IF Alignment.

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	24MC (10MC Sweep)	21.7MC 22.9MC 26.2MC	See note above	Vert. Amp. to Point (A) Low side to chassis.		Check for response curve as per Fig. 1 with markers as shown. If necessary slightly retouch A1 thru A6 for optimum response.

SOUND IF ALIGNMENT

See instructions under Video IF Alignment.

If complete video IF alignment is not performed, step 5 of video IF alignment must be performed before beginning sound IF alignment.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
8.	.01MFD	High side to pin 5 (Grid) of 6J6 (V2). Low side to chassis.	21.7MC (Unmod.)	See note above	DC Probe to Point (B) Common to chassis.	A7,A8	Adjust for maximum deflection.
9.	.01MFD	"	"	"	DC Prbbe thru 1 Meg. to point (C) Common to chassis.	A9	Adjust for maximum deflection.
10.	.01MFD	"	"	"	DC Probe to Point (D) Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.01MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	21.7MC (450KC Sweep)	21.7MC	See note above	Vert. Amp. to Point (B) Low side to chassis.	A7,A8, A9	Adjust for maximum amplitude and symmetry as per Fig 2.
9.	.01MFD	"	"	"	"	Vert. Amp. to Point (D) Low side to chassis.	A9,A10	Adjust A10 so 21.7MC marker occurs at center of crossover lines as per Fig 3. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines. Continue with step 11.

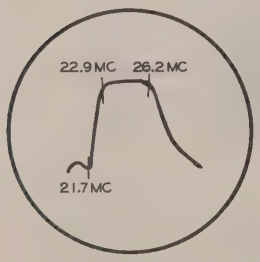


FIG. 1

FIG. 2

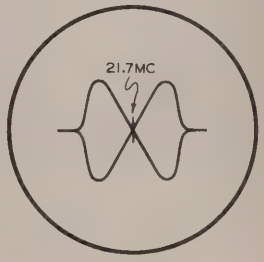


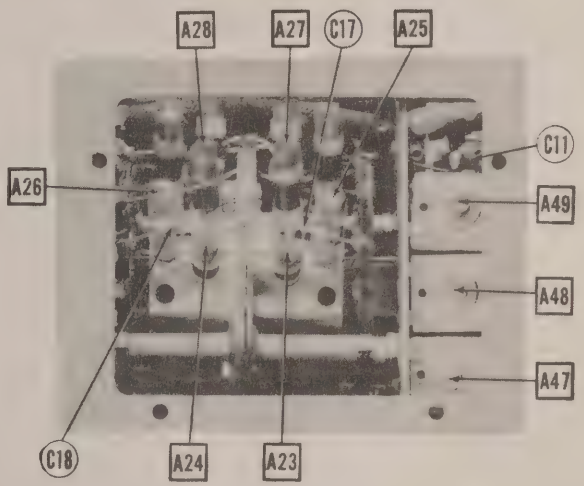
FIG. 3

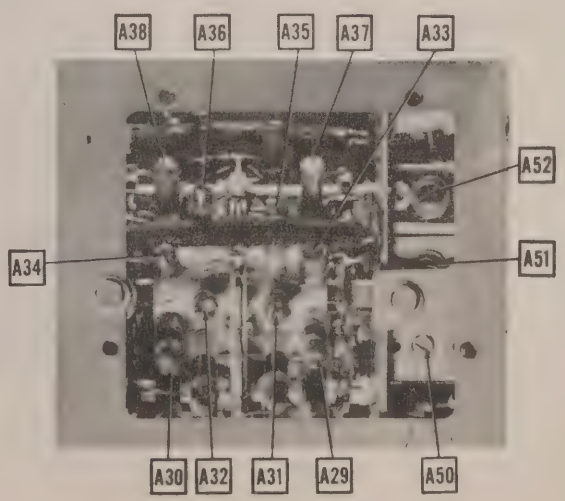
ALIGNMENT INSTRUCTIONS (CONT.)

OSCILLATOR ALIGNMENT

Set the fine tuning control to the mid-position of its range.
Match the generator output to the 300Ω input. If generator has 50 ohms output use a 100Ω resistor in series with the high side and 150Ω in series with the low side. If generator has 30Ω output use a 120Ω resistor in series with the high side and 150Ω in series with the low side.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	See note above	Across 300Ω antenna terminals.	59.75MC (Unmod.)	2	DC Probe to Point ◇ Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
12.	"	"	61.25MC (Unmod.)	3	"	A12	"
13.	"	"	67.25MC (Unmod.)	4	"	A13	"
14.	"	"	77.25MC (Unmod.)	5	"	A14	"
15.	"	"	83.25MC (Unmod.)	6	"	A15	"
16.	"	"	175.25MC (Unmod.)	7	"	A16	"
17.	"	"	181.25MC (Unmod.)	8	"	A17	"
18.	"	"	187.25MC (Unmod.)	9	"	A18	"
19.	"	"	193.25MC (Unmod.)	10	"	A19	"
20.	"	"	199.25MC (Unmod.)	11	"	A20	"
21.	"	"	205.25MC (Unmod.)	12	"	A21	"
22.	"	"	211.25MC (Unmod.)	13	"	A22	"





MOTOROLA MODELS VK-106, 107, 10VK9, 10VT3, 12VK18B, R, 12VT16, B, R

ALIGNMENT INSTRUCTIONS (CONT.)

RF AND MIXER ALIGNMENT

When adjusting RF coils, detune one adjustment counter-clockwise, adjust the other adjustment from maximum deflection. Then turn the formerly detuned adjustment for maximum. Do not readjust first adjustment.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
23.	See note above—Osc. alignment."	Across antenna terminals.	58MC (Unmod.)	2	DC Probe to Point (A) Common to B-.	A23, A24	See note above.
24.	"	"	64MC (Unmod.)	3	"	A25, A26	"
25.	"	"	70MC (Unmod.)	4	"	A27, A28	"
26.	"	"	80MC (Unmod.)	5	"	A29, A30	"
27.	"	"	86MC (Unmod.)	6	"	A31, A32	"
28.	"	"	178MC (Unmod.)	7	"	A33, A34	"
29.	"	"	184MC (Unmod.)	8	"	A35, A36	"
30.	"	"	190MC (Unmod.)	9	"	A37, A38	"
31.	"	"	196MC (Unmod.)	10	"	A39, A40	"
32.	"	"	202MC (Unmod.)	11	"	A41, A42	"
33.	"	"	208MC (Unmod.)	12	"	A43, A44	"
34.	"	"	214MC (Unmod.)	13	"	A45, A46	"

ANTENNA ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
35.	See note under "Osc. Align."	Across antenna terminals.	66MC (Unmod.)	6	DC Probe to Point (A). Common to chassis.	A56	Adjust for maximum deflection.
36.	"	"	58MC	2	"	A47	"
37.	"	"	64MC	3	"	A48	"
38.	"	"	70MC	4	"	A49	"
	A fixed trimmer has been used on channel 5 in some models thereby not necessitating an adjustment for this channel. However, those models having a variable trimmer should be adjusted at 80MC.						
39.	"	"	214MC	13	"	A57	"
40.	"	"	178MC	7	"	A50	"
41.	"	"	184MC	8	"	A51	"
42.	"	"	190MC	9	"	A52	"
43.	"	"	196MC	10	"	A53	"
44.	"	"	202MC	11	"	A54	"
45.	"	"	208MC	12	"	A55	"

4.5MC TRAP ADJUSTMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
46.	.01MFD	High side to pin 2 (Plate) of 6AL5 (V7). Low side to chassis.	4.5MC (Unmod. max. output)	Any	DC Probe thru detector (Fig. 4) to pin 1 (plate of 12AV7) (V8). Common to chassis.	A58	Adjust for MINIMUM deflection.

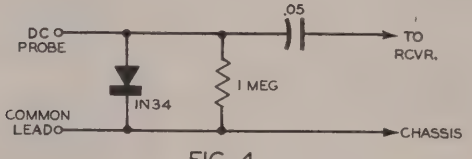


FIG. 4

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.4VDC	0V	6.3VAC	0V	175VDC	100VDC	0V		
V 2	6J6	195VDC	57VDC	0V	6.3VAC	-2.4VDC	§-4.8VDC	0V		
V 3	6BA6	-.3VDC	0V	6.3VAC	0V	92VDC	92VDC	.8VDC		
V 4	6BA6	-.3VDC	0V	6.3VAC	0V	92VDC	92VDC	.8VDC		
V 5	6AG5	0V	.8VDC	6.3VAC	0V	92VDC	95VDC	.8VDC		
V 6	6AG5	0V	2VDC	6.3VAC	0V	250VDC	117VDC	2VDC		
V 7	6AL5	♦0V	♦0V	6.3VAC	0V	♦10VDC	♦4VDC	♦-10VDC		
V 8	12AU7	♦80VDC	♦2VDC	♦6.8VDC	0V	0V	260VDC	25VDC	35VDC	6.3VAC
V 9	6AU6	0V	0V	6.3VAC	0V	85VDC	85VDC	.6VDC		
V 10	6AU6	-.7VDC	0V	6.3VAC	0V	90VDC	95VDC	.7VDC		
V 11	6AU6	-.9VDC	0V	6.3VAC	0V	50VDC	50VDC	0V		
V 12	6T8	-1.3VDC	-4VDC	-4VDC	0V	6.3VAC	2.9VDC	0V	-.4VDC	50VDC
V 13	6V6GT	0V	6.3VAC	275VDC	290VDC	0V	300VDC	0V	19VDC	
V 14	12AU7	215VDC	29VDC	43.5VDC	0V	0V	-43VDC	0V	0V	6.3VAC
V 15	12AU7	225VDC	-43VDC	-5VDC	0V	0V	♦180VDC	♦-11VDC	♦0V	6.3VAC
V 16	6SN7GT	♦0V	♦340VDC	♦50VDC ♦95VDC	♦-15VDC	♦70VDC ♦150VDC	♦0V	0V	6.3VAC	
V 17	6AL5	♦5.4VDC	♦-6.3VDC	6.3VAC	0V	♦0V	0V	♦0V		
V 18	6SN7GT	♦-.4VDC	♦110VDC	♦10VDC	♦0V	♦250VDC	♦10VDC	0V	6.3VAC	
V 19	6BG6G	0V	0V	♦12VDC	♦12VDC	♦.1VDC	♦360VDC	6.3VAC	♦275VDC	TOP CAP *
V 20	5V4G	0V	380VDC	380VDC	310VDC	0V	310VDC	0V	380VDC	
V 21	1B3GT	* DO NOT MEASURE								
V 22	5U4G	0V	330VDC	330VDC	375VAC	290VDC	375VAC	-55VDC	330VDC	
V 23	5Y3GT	0V	160VDC	0V	225VAC	260VDC	225VAC	0V	160VDC	
V 24	12LP4	♦175VDC	80VDC	PIN 10 360VDC	PIN 11 175VDC	PIN 12 ♦175VDC				

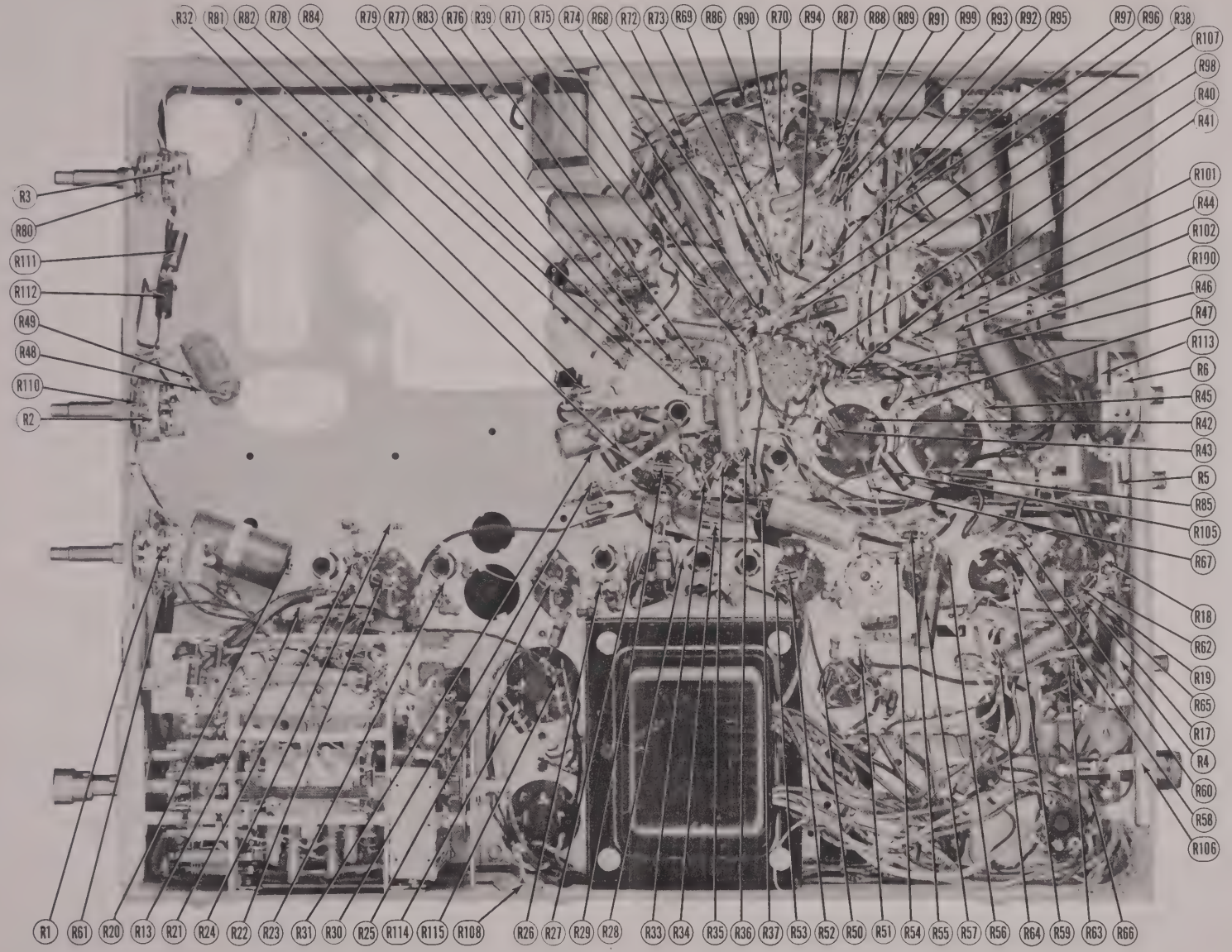
♦ Measured from pin 6 of V16
* Do not measure
♦ 6.3VAC measured across filament.
§ Taken with vacuum tube voltmeter.
Note: Contrast control set at maximum for these measurements.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	600KΩ	0Ω	.1Ω	0Ω	†19KΩ	†83KΩ	0Ω		
V 2	6J6	†10KΩ	♯16KΩ	0Ω	.1Ω	1 Meg.	15KΩ	0Ω		
V 3	6BA6	10KΩ	0Ω	.1Ω	0Ω	♯1.2KΩ	♯1.2KΩ	68Ω		
V 4	6BA6	3.2KΩ	0Ω	.1Ω	0Ω	♯1.2KΩ	♯1.2KΩ	68Ω		
V 5	6AG5	.1Ω	100Ω	.1Ω	0Ω	♯1.2KΩ	♯1.2KΩ	100Ω		
V 6	6AG5	.1Ω	220Ω	.1Ω	0Ω	†2KΩ	†48KΩ	220Ω		
V 7	6AL5	♦0Ω	♦0Ω	.1Ω	0Ω	♦22KΩ	♦22KΩ	♦4.7KΩ		
V 8	12AU7	4.5KΩ	710KΩ	♦330Ω	0Ω	0Ω	†4.5KΩ	4.5KΩ	100Ω	.1Ω
V 9	6AU6	.2Ω	0Ω	.1Ω	0Ω	♯2.2KΩ	♯2.2KΩ	100Ω		
V 10	6AU6	10KΩ	0Ω	.1Ω	0Ω	♯1.2KΩ	♯1.2KΩ	100Ω		
V 11	6AU6	100KΩ	0Ω	.1Ω	0Ω	♯10KΩ	♯10KΩ	0Ω		
V 12	6T8	100KΩ	100KΩ	170KΩ	0Ω	.1Ω	48KΩ	0Ω	10 Meg.	†1 Meg.
V 13	6V6GT	0Ω	.1Ω	†900Ω	†700Ω	470KΩ	†100Ω	0Ω	470Ω	
V 14	12AU7	†20KΩ	3KΩ	1.3KΩ	0Ω	0Ω	10 Meg.	0Ω	0Ω	.1Ω
V 15	12AU7	†6KΩ	10 Meg.	7KΩ	0Ω	0Ω	†33KΩ	3.3 Meg.	♦0Ω	.1Ω
V 16	6SN7GT	3.3 Meg.	†2KΩ	♦5.5KΩ ♦570Ω	1 Meg.	◓3.6Meg. ◓1.6Meg.	♦0Ω	0Ω	.1Ω	
V 17	6AL5	4.8 Meg.	4.8 Meg.	.1Ω	0Ω	47KΩ	0Ω	47KΩ		
V 18	6SN7GT	82KΩ	◓240KΩ	♦1.5KΩ	10 Meg.	◓25KΩ	♦1.5KΩ	0Ω	.1Ω	
V 19	6BG6G	Inf.	0Ω	♦82Ω	♦82Ω	1 Meg.	†120Ω	.1Ω	◓15KΩ	TOP CAP ◓210Ω
V 20	5V4F	Inf.	650KΩ	650KΩ	†110Ω	Inf.	†110Ω	Inf.	650KΩ	
V 21	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ◓400Ω
V 22	5U4G	Inf.	15KΩ	15KΩ	410Ω	15KΩ	420Ω	15KΩ	15KΩ	
V 23	5Y3GT	Inf.	30KΩ	Inf.	420Ω	10KΩ	415Ω	Inf.	30KΩ	
V 24	12LP4	47KΩ	800KΩ	PIN 10 ◓ 0Ω	PIN 11 47KΩ	PIN 12 47KΩ				

† Measured from pin 8 of V22
♯ Measured from pin 2 of V23
◓ Measured from pin 8 of V20
♦ Measured from pin 6 of V16

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Converter	6J6	6J6	7BF	
V3	1st Video IF	6BA6	6BA6	7BK	
V4	2nd Video IF	6BA6	6BA6	7BK	
V5	3rd Video IF	6AG5	6AG5	7BD	
V6	4th Video IF	6AG5	6AG5	7BD	
V7	Video Det. and Noise Limiter	6AL5	6AL5	6BT	
V8	Video Amp.	12AU7	12AU7	9A	
V9	1st Sound IF	6AU6	6AU6	7BK	
V10	2nd Sound IF	6AU6	6AU6	7BK	
V11	Limiter	6AU6	6AU6	7BK	
V12	Disc.-AF Amp.	6T8	6T8	9E	
V13	Audio Output	6V6GT	6V6GT	7AC	
V14	1st Sync. Clipper	12AU7	12AU7	9A	
V15	Sync. Pulse Amp.-2nd Sync. Clipper	12AU7	12AU7	9A	
V16	Vert. Osc.-Vert. Amp.	6SN7GT	6SN7GT	8BD	
V17	Hor. Phase Det.	6AL5	6AL5	6BT	
V18	Hor. Osc.	6SN7GT	6SN7GT	8BD	
V19	Hor. Output	6BG6G	6BG6G	5BT	
V20A	Damper	5V4G	5V4G	5L	Used in chassis TS-9E and TS-15C.
B	Damper	6W4GT	6W4GT	4CG	Used in chassis TS-9E1 and TS-15C1.
V21	HV Rectifier	1B3GT	1B3GT	3C	
V22	LV Rectifier	5U4G	5U4G	5T	
V23	LV Rectifier	5Y3GT	5Y3GT	5T	
V24A	Picture Tube	12LP4	12LP4	12D	Used in chassis TS-15C and TS-15C1.
B	Picture Tube	10BP4	10BP4	12D	Used in chassis TS-9E and TS-9E1.

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: MOTOROLA PART No.	REPLACEMENT DATA: AEROVOX PART No.	REPLACEMENT DATA: CORNELL-DUBILIER PART No.	REPLACEMENT DATA: ERIE PART No.	REPLACEMENT DATA: SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	23A484197	AFH88J8D	UP11CJ 1067		TVL-54	■ Filter
B	40	450						◓ Filter
C	40	150						▲ Filter
C2A	40	450	23A484196	AFH822J50A	UP9DJ 1068		D6292	◓ Filter
B	10	450						■ Vert. Output Dec.
C	10	450						▲ Filter
D	250	25						Vert. Output Cath. Byp.
C3A	40	300	23A484194	AFH888G40	UP9DJ 1070		D6286	■ Filter
B	40	300						◓ Filter
C	40	300						▲ Filter
D	20	150						Filter
C4A	40	450	23A484195	AFH832J5A	UP9DJ 1069		D6290	◓ Decoupling
B	15	450						■ Vert. Osc. Dec.
C	10	450						▲ Decoupling
D	25	25						Output Cath. Bypass
C5	40	150	23A485454	PRS250/40	BR4015		UT-401	Bias Filter
C6	10	450	23K489031	PRS450/10	BR1045		TVA-21	Decoupling
C7	7.5		21K790454					Ant. Coupling
C8	7.5		21K790454					Ant. Coupling
C9	100		21K790651			GP1K-100		Isolation *
C10	10		21K790455			NP0K-10		Fixed Padder
C11	3.3		21A489052			NP0K-3.3		Fixed Trimmer
C12	3.3		21A489052			NP0K-3.3		Fixed Trimmer
C13	1000		21K478410			GP2L-001		Bias Filter
C14	1000		21K478410			GP2L-001		RF Screen Bypass
C15	1000		21K478410			GP2L-001		RF Bypass
C16	100		21K470736			N750L-100		RF Coupling
C17	2.2		21K471216					Fixed Trimmer
C18	2.2		21K471216					Fixed Trimmer
C19	25		21A470738			GP1K-25		RF Coupling
C20	1.5		21K482296			NP0K-1.5		Osc. Coupling
C21	25		21A470738			GP1K-25		Osc. Grid Cap.
C22	25		21A470738			GP1K-25		Osc. Feedback
C23	1.5		21K482296			NP0K-1.5		Fixed Trimmer
C24	1000		21K478410			GP2L-001		Osc. Plate Dec.
C25	1000		21K478410			GP2L-001		Conv. Fil. Bypass
C26	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	RF Bypass
C27	25		21K28816	1468-000025	5W5Q25	GP1K-25	MS-425	V. IF Coupling
C28	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Conv. Plate Dec.
C29	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Bias Filter
C30	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Filament Bypass
C31	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	1st V. IF Fil. Byp.
C32	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	1st V. IF Decoupling
C33	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Bias Filter
C34	5000		21A470789	1467-005	1D5D5	811-005	29C1	Bias Filter
C35	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	2nd V. IF Decoupling
C36	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	3rd V. IF Cath. Bypass
C37	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	3rd V. IF Fil. Bypass
C38	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	3rd V. IF Decoupling
C39	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	4th V. IF Cath. Bypass
C40	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	4th V. IF Screen Bypass
C41	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	4th V. IF Plate Decoup.
C42	5000		21A470789	1467-005	1D5D5	811-005	29C1	V. IF Coupling
C43	10		21A101778	1468-00001	5W5Q1	GP1K-10	MS-41	RF Bypass
C44	5000		21A470789	1467-005	1D5D5	811-005	29C1	RF Bypass
C45	25		21K28816	1469-000025	5R5Q25	NP0L-25	MS-425	Fixed Trimmer
C46	.25	200	8A471356	P488-25	GT2P25		TC-2	Video Coupling
C47	.05	100	8K471166	P288-05	GT2S5		TM-15	Limiter Filter
C48	1000	500	21R6663	1468-001	1W5D1	GP2L-001	1FM-21	1st V. Amp. Cath. Bypass
C49	.05	600	8K471151	P688-05	GT6S5		TM-15	Video Coupling
C50	25		21K28816	1469-000025	5R5Q25	NP0L-25	MS-425	Fixed Trimmer
C51	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	1st S. IF Decoupling
C52	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	IF Coupling
C53	1000		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	2nd S. IF Decoupling
C54	5000		21A470789	1467-005	1D5D5	811-005	29C1	2nd S. IF Fil. Bypass
C55	68	500	21R2740	1468-000075	5W5Q7	GP1K-68	1FM-475	Bias Filter

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA MOTOROLA PART No.	AEROVOX PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1	1mmf		21K478410	1469-1	NPO-1-001	1FM-21	1FM-21	RF Bypass
C2	1mmf		21K478410	1469-1	NPO-1-001	1FM-21	1FM-21	Limiter Decoupling
C3	.1		21K28816	1469-4	1N5-1-25	1B-1-25	1B-1-25	RF Bypass
C4	.02	400	21R6662	1469-3	1N5-2-250	1FM-325	1FM-325	De-emphasis
C5	.1	150	8K471163	1469-2	1N5-1-150	1FM-21	1FM-21	Tone Comp.
C6	.01		21A470789	1469-5	1N5-1-10	2BC1	2BC1	Tone Comp.
C7	.005		21A470789	1469-5	1N5-1-10	2BC1	2BC1	Audio Coupling
C8	.02		21R6664	1469-4	1N5-2-250	1FM-325	1FM-325	AF Plate Bypass
C9	.005		8K471162	1469-4	1N5-1-50	2BC1	2BC1	Audio Coupling
C10	.005		8K471162	1469-4	1N5-1-50	GP2M-005	TM-25	Output Plate Bypass
C11	10			1469-1	1P5-1-25		TC-2	Decoupling
C12	.1			1469-4	1P5-1-25		TM-1	Sync. Coupling
C13	.1		21K38224	1468-0001	SM5T1	GP1K-100	1FM-31	Sync. Coupling
C14	.005	400	8K780005	P688-005	GT6D2	GP2M-005	TM-22	Integrator Net.
C15	.005		8K780006	P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C16	.005			P688-005	GT6D5	GP2M-005	TM-25	Integrator Net.
C17	.02		21R6567	1467-005	1D5D5	GP2M-005	TM-25	Vert. Osc. Grid Cap.
C18	.1		21R7169	P488-1	GT4P1		TM-1	Vert. Discharge
C19	.1		21K478410	1468-001	1W5D1	GP2L-001	1FM-21	Vert. Discharge
C20	.1	400	8K434148	P488-25	GT4P25		TC-2	Vert. Sweep Coupling
C21	.1			1468-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C22	.1		21R6663	1468-001	1W5D1	GP2L-001	1FM-21	Hor. Sync. Coupling
C23	.1		8K471163	P488-01	GT2S1	GP2-335-01	TM-11	AFC Filter
C24	.1		8K471151	P688-05	GT6S5		TM-15	AFC Feedback
C25	.1			1468-001	1W5D1	GP2L-001	1FM-21	AFC Filter
C26	.1		8K471163	P488-01	GT2S1	GP2-335-01	TM-11	AFC Filter
C27	.1			1468-0025	SW5T25	GP2K-250	1FM-325	Hor. MV Feedback
C28	.1			1468-04	1W5D1		1FM-21	Fixed Trimmer
C29	.1			1468-04	1W5D1		1FM-21	Fixed Trimmer
C30	.1			1468-04	SW5T1		1FM-21	Hor. Discharge
C31	.1	600	21R6662	1468-0025	SW5T25	GP2K-250	1FM-325	Hor. Sweep Coupling
C32	.05		8A471356	P488-25	GT2P25		TC-2	Hor. Output Cath. Bypass
C33	.1		8A471151	P688-05	GT6S5		TM-15	Hor. Output Screen Byp.
C34	.1				GT16S3		MB-13	Damper Filter
C35	.1			P488-03	GT7P1		TM-1	Damper Filter
C36	.1			P688-05	GT6S5		TM-15	Fixed Trimmer
C37	.1	10		P488-5	GT2F5		TC-5	Hor. Sweep Coupling
C38	.005	6000	21K478415					HV Filter
C39	.05	600	21R6664	P488-25	GT2P25		TC-2	Pic. Tube Cath. Dec.
C40	.1		21A478410	1468-001	1W5D1	GP2L-001	1FM-21	Pic. Tube Fil. Bypass †
C41	.1		21A478410	1468-001	1W5D1	GP2L-001	1FM-21	Filament Bypass
C42	.1		21A478410	1468-001	1W5D1	GP2L-001	1FM-21	RF Bypass †

* Some models use 200MMF in this application.
† Not used in all models.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1a	1 Meg.	2	18K489005			Tone control and switch (Dual Concentric)
R1b	2 Meg.	2				Volume control, tapped @ 250KΩ
R2a	1 Meg.	2	18A484072			Brightness control (Dual Concentric)
R2b	2 Meg.	2				Contrast control (Dual Concentric)
R3a	5 Meg.	2	18A484073			Horiz. hold control
R3b	1 Meg.	2				Vert. hold control
R4	1 Meg.	2		411-189	M-38-8	Vert. size control
R5	1 Meg.	2		411-114	M-10-8	Vert. linearity control
R6	1 Meg.	4	18K484354		10-1000	Focus control, (Wire Wound)

RESISTORS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R7	470KΩ	½	6R6377		RF Grid
R8	18KΩ	1	6R476014	BT-2-18K	RF Plate
R9	82KΩ	1	6R5557		RF Screen
R10	100Ω	½	6R6229		Bias Network
R11	470KΩ	½	6R6377		Conv. Grid
R12	47mM	½	6R6377		Conv. Grid
R13	15KΩ 20%	½	6R2119	BTS-15K	Conv. Plate Decoupling
R14	15KΩ 20%	½	6R2119	BTS-15K	Osc. Grid
R15	820Ω	1	6R5610		Osc. Plate
R16	100Ω 20%	½	6R6301		Osc. Plate Decoupling
R17	100KΩ	½	6R6031	BTS-100K	Bias Network
R18	47KΩ	½	6R6048	BTS-47K	Voltage Divider
R19	1 Meg.	½	6R6054	BTS-1 Meg.	Voltage Divider
R20	100Ω	½	6R6229	BTS-1000	Bias Network
R21	82Ω	½	6R2004		1st Video IF Grid
R22	68Ω 20%	½	6R6007		1st Video IF Cathode
R23	22KΩ	½	6R6397		2nd Video IF Transformer Shunt
R24	100Ω	½	6R6229	BTS-1000	Bias Network
R25	68Ω	½	6R6007		2nd Video IF Cathode
R26	33KΩ	½	6R6410		3rd Video IF Transformer Shunt
R27	100Ω 20%	½	6R6018		3rd Video IF Cathode
R28	470Ω	½	6R6080	BTS-4700	4th Video IF Transformer Shunt
R29	220Ω 20%	½	6R3933		4th Video IF Cathode
R30	100Ω	½	6R6229		4th Video IF Plate Decoupling
R31	47KΩ	½	6R6048	BTS-47K	4th Video IF Screen Decoupling
R32	100KΩ	1	6R6031	BTA-100K	Voltage Divider See Note 1
R33	68Ω	½	6R6429	BTS-6800	5th Video IF Transformer Shunt See Note 2
R34	4700Ω	½	6R6080	BTS-4700	Video Det. Diode Load
R35	22KΩ	½	6R6397	BTS-22K	Bias Network
R36	220KΩ	½	6R6407	BTS-220K	Voltage Divider
R37	47KΩ	½	6R6048	BTS-47K	Video Amp. Grid
R38	330Ω	1	6R6029	BTA-330	Voltage Divider
R39	33KΩ	½	6R6410	BW-½-330	Video Amp. Cathode
R40	220KΩ	½	6R6407	BTS-220K	Video Amp. Plate
R41	18KΩ	½	6R2089	BTS-1800	Video Amp. Grid See Note 3
R42	18KΩ	½	6R2089	BTS-1800	Video Amp. Grid See Note 3
R43	100Ω 20%	½	6R6018	BW-½-100	Video Amp. Cathode
R44	100Ω	1	6R6029	BTA-1000	Video Amp. Plate
R45	330Ω	1	6R6029	BTA-330	Video Amp. Plate

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA MOTOROLA PART No.	IRC PART No.	IDENTIFICATION CODES
R46	1.5Meg.20%	½	6R6056	BTS-1.5 Meg.	Voltage Divider
R47	1.5Meg 20%	½	6R6056	BTS-1.5 Meg.	Picture Tube Grid
R48	47KΩ	½	6R6048	BTS-47K	Voltage Divider
R49	47KΩ	½	6R6048	BTS-47K	Voltage Divider
R50	100Ω 20%	½	6R6018		1st Sound IF Cathode
R51	100Ω	½	6R6229		1st Sound IF Decoupling
R52	10KΩ	½	6R6320		2nd Sound IF Grid
R53	100Ω 20%	½	6R6018		2nd Sound IF Cathode
R54	100KΩ	½	6R6031		Limiter Grid
R55	100Ω 20%	½	6R6018	BW-½-100	Voltage Divider
R56	15KΩ 20%	½	6R2119	BTS-15K	Voltage Divider
R57	10KΩ 20%	2	6R476060	BT-2-10K	Voltage Dropping
R58	100KΩ	½	6R6031	BTS-100K	Disc. Load
R59	100KΩ	½	6R6031	BTS-100K	Disc. Load
R60	100KΩ	½	6R6031	BTS-100K	De-emphasis
R61	33KΩ	½	6R6410	BTS-33K	Tone Compensation
R62	10 Meg.20%	½	6R2109	BTS-10 Meg.	AF Grid
R63	1 Meg.20%	½	6R6054	BTS-1 Meg.	AF Plate
R64	470KΩ	½	6R6377	BTS-470K	Output Grid
R65	470Ω	2	6R2010	BW-2-470	Output Cathode (Wire Wound)
R66	560Ω	1	6R476036	BTA-560	Filter
R67	330Ω	½	6R6029	BW-½-330	Voltage Divider
R68	15KΩ	2	6R476014	BT-2-18K	1st Sync. Clipper Plate
R69	3.3Meg.20%	½	6R2118	BTS-3.3 Meg.	Sync. Amp. Grid
R70	33KΩ	2	6R6768	BT-2-33K	Sync. Amp. Plate
R71	10 Meg.20%	½	6R2109	BTS-10 Meg.	2nd Sync. Clipper Grid
R72	330Ω	½	6R6581	BTS-3300	2nd Sync. Clipper Plate
R73	1500Ω 20%	½	6R6161	BTS-1500	2nd Sync. Clipper Cathode
R74	470Ω	½	6R6080	BTS-4700	2nd Sync. Clipper Cathode
R75	22KΩ	½	6R6397	BTS-22K	Integrator
R76	820Ω	½	6R6004	BTS-8200	Integrator
R77	6800Ω	½	6R6428	BTS-6800	Integrator
R78	470KΩ	½	6R6377	BTS-470K	Vert. Osc. Transformer Shunt
R79	1 Meg.20%	½	6R6004	BTS-1 Meg.	Vert. Osc. Grid
R80	3.3Meg20%	½	6R2118	BTS-3.3 Meg.	Voltage Divider
R81	1.5Meg20%	½	6R3966	BTS-1.5 Meg.	Vert. Osc. Plate
R82	560Ω	½	6R6291	BTS-560	Vert. Output Cathode
R83	3.3Meg20%	½	6R2118	BTS-3.3 Meg.	Vert. Output Grid
R84	330Ω	½	6R5581	BTS-3300	Vert. Peaking
R85	100KΩ	1	6R6031	BTA-100K	Filter
R86	1000Ω	1	6R476004	BTA-1000	Filter
R87	100KΩ	½	6R6031	BTS-100K	Horiz. Phase Det. Load
R88	100KΩ	½	6R6031	BTS-100K	Horiz. Phase Det. Load
R89	4.7 Meg.	½	6R6446	BTS-4.7 Meg	Horiz. Phase Det. Load
R90	47KΩ	½	6R6048	BTS-47K	Feedback Network
R91	2700Ω	1	6R5686	BTA-2700	Feedback Network
R92	4.7 Meg.	½	6R6446	BTS-4.7 Meg	Horiz. AFC Filter Network
R93	1500Ω 20%	½	6R6161	BTS-1500	Horiz. Osc. Cathode
R94	82KΩ	½	6R5644	BTS-82K	Horiz. Osc. Grid
R95	560Ω	½	6R6117	BTS-5600	Horiz. Osc. Plate
R96	220KΩ	½	6R6407	BTS-220K	Horiz. Osc. Plate
R97	18KΩ	1	6R5734	BTA-18K	Filter
R98	47Ω 20%	½	6R2108		Parasitic Supp.
R99	1 Meg.20%	½	6R6004	BTS-1 Meg.	Horiz. Output Grid
R100	82Ω	2	6R486222	BW-2-82	Horiz. Output Cathode (Wire Wound)
R101	15KΩ	2	6R5732	BT-2-15K	Horiz. Output Screen
R102	2200Ω	2	6R5687	BT-2-2200	Horiz. Centering
R103	3.3Ω	½	17K485412		HV Rect. Filament (Wire Wound)
R104	820KΩ	1	6R2053		HV Filter
R105	1000Ω 20%	2	6R476004	BW-2-1000	Bleeder
R106A	1000Ω			AB-1000	Filter (Wire Wound)
B	1500Ω	25	17A485413	AB-1500	Voltage Divider (Wire Wound)
C	7000Ω			AB-7000	Voltage Divider (Wire Wound)
R107	470Ω	2	6R2010	BW-2-470	Voltage Divider See Note 5
R108	1000Ω 20%	13	17K780343	AB-1000	Voltage Divider (Wire Wound)
R109	1000Ω 20%	2	6R476004	BT-2-1000	Voltage Divider See Note 4
R110	1200Ω	½	6R6393	BTS-1200	Voltage Divider
R111	1000Ω 20%	2	6R476004	BT-2-1000	Voltage Divider
R112	1000Ω 20%	2	6R476004	BT-2-1000	Voltage Divider
R113	1000Ω 20%	2	6R476004	BT-2-1000	Focus Coil Shunt
R114	560Ω	2	6R486036	BW-2-560	Filter
R115	560Ω	2	6R486036	BW-2-560	Filter
R116	3300Ω	½	6R5581	BTS-3300	Video Amp. Grid See Note 6
R117	4700Ω	½	6R6080	BTS-4700	Sync. Coupling See Note 6

Note 1. Used only in chassis TS-15C and TS-9E.
Note 2. Some models use 10KΩ resistor in this application.
Note 3. Chassis TS-9E uses 1500Ω resistor in this application.
Note 4. Used in some TS-15C chassis, and TS-9E chassis.
Note 5. 68Ω resistor is used in some TS-15C chassis, and TS-9E chassis.
Note 6. Used only in early production of TS-15C chassis.

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	10Ω	3.2Ω	50C780320		7E §	§ Supplied on order. State field resistance and current.
	CONE DIA.	V. C. DIA.				
SP2	7 1/4"	3/4"				

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ 2.2A	740VCT .28ADC 450VCT .050ADC	5VAC @ 3A	5VAC @ 2A	25C484095	P-8157		TP-450
		SEC. 4	SEC. 5	SEC. 6				
		5VAC @ 2A	6.3VAC @ 7.8A	6.3VAC @ .6A				

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	16Ω		24B790055				Hor.Osc. Coil
T3	56Ω	160Ω	24B485416	A-8111 ‡	A-3000 ‡	TBO-1 ‡	Vert.Block Osc.Trans.
T4	330Ω	SEC. 1	25C90052	A-8117		TPB-1	Hor.Output Trans.
	Tap @ 170Ω	10.5Ω Tap. @ 68Ω.					
		SEC. 2					
		0Ω					
T5	775Ω	9Ω	25B790015				Vert.Output Trans.
T6A	14Ω		24K485475	DY-1			Hor.Deflection Coil
B	6Ω						Vert.Deflection Coil
T7	540Ω		24B485467				Focus Coil

‡ Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	8300Ω	3.5Ω	310Ω	.4Ω	25B489030	A-3877 ‡	A-2930 ‡	RO-9 ‡	‡ Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	MEISSNER PART No.	NOTES
L1	High and Low Band Ant. Trans.	Hi.0Ω Lo.0Ω	0Ω	1X790492		Complete with C7, C8, C9, C10 and tuning cores.
L2A	RF Coil	0Ω		24K485428		Channel #2. Includes winding, form & core
B	RF Coil	0Ω		24K485429		Channel #3. Includes winding, form & core
C	RF Coil	0Ω		24K485430		Channel #4. Includes winding, form & core
D	RF Coil	0Ω		24K485431		Channel #5. Includes winding, form & core
E	RF Coil	0Ω		24K485432		Channel #6. Includes winding, form & core
F	RF Coil	0Ω		24A470764		Channel #7. Winding only.
G	RF Coil	0Ω		24A470764		Channel #8. Winding only.
H	RF Coil	0Ω		24K485426		Channel #9. Winding only.
I	RF Coil	0Ω		24A470763		Channel #10.Winding only.
J	RF Coil	0Ω		24A470763		Channel #11.Winding only.
K	RF Coil	0Ω		24A470763		Channel #12.Winding only.
L	RF Coil	0Ω		24A470763		Channel #13. Winding only.
L3A	Mixer Grid	0Ω		24K485428		Channel #2. Includes winding, form & core.
B	Mixer Grid	0Ω		24K485429		Channel #3. Includes winding, form & core.
C	Mixer Grid	0Ω		24K485430		Channel #4. Includes winding, form & core.
D	Mixer Grid	0Ω		24K485431		Channel #5. Includes winding, form & core.
E	Mixer Grid	0Ω		24K485432		Channel #6. Includes winding, form & core.
F	Mixer Grid	0Ω		24A470763		Channel #7. Winding only.
G	Mixer Grid	0Ω		24K471335		Channel #8. Winding only.
H	Mixer Grid	0Ω		24K471335		Channel #9. Winding only.
I	Mixer Grid	0Ω		24K471335		Channel #10. Winding only.
J	Mixer Grid	0Ω		24A470765		Channel #11. Winding only.
K	Mixer Grid	0Ω		24K485427		Channel #12. Winding only.
L	Mixer Grid	0Ω		24K485427		Channel #13. Winding only.
L4A	Osc. Coil	0Ω		24K485433		Channel #2. Includes winding, form & core.
B	Osc. Coil	0Ω		24K485434		Channel #3. Includes winding, form & core.
C	Osc. Coil	0Ω		24K485434		Channel #4. Includes winding, form & core.
D	Osc. Coil	0Ω		24K485435		Channel #5. Includes winding, form & core.
E	Osc. Coil	0Ω		24K485435		Channel #6. Includes winding, form & core.
F	Osc. Coil	0Ω		24A485436		Channel #7. Winding only.
G	Osc. Coil	0Ω		24A485437		Channel #8. Winding only.
H	Osc. Coil	0Ω		24A485437		Channel #9. Winding only.
I	Osc. Coil	0Ω		24K485438		Channel #10. Winding only.
J	Osc. Coil	0Ω		24K485440		Channel #11. Winding only.
K	Osc. Coil	0Ω		24K485440		Channel #12. Winding only.
L	Osc. Coil	0Ω		24K485440		Channel #13. Winding only.
L5	Fil. Choke	0Ω		24A90064		
L6	RF Choke	1Ω		24A780127		1 Microhenry
L7	1st Video IF	.1Ω		24B780394		Complete with iron core.
L8	RF Choke	1Ω		24A780127		1 Microhenry.
L9	2nd Video IF	.1Ω	.1Ω	24B489071		Complete with iron core.
L10	RF Choke	1Ω		24A780127		1 Microhenry.
L11	3rd Video IF	.1Ω	.1Ω	24B489071		Complete with iron core.
L12	RF Choke	1Ω		24A780127		1 Microhenry.
L13	4th Video IF and Sound Take-Off	.1Ω	.1Ω	24B489073		Complete with iron core. Sound Take-Off coil 0Ω.
L14	5th Video IF	.1Ω	.1Ω	24K780390		Complete with iron core.
L15	Fil. Choke	0Ω		24A90064		
L16	Fil. Choke	0Ω		24A90064		
L17	Fil. Choke	0Ω		24A90064		
L18	4.5MC Trap	2.3Ω		24B484077		Complete with iron core.
L19	Peaking	6Ω		24K780388		Wound on 1 Meg. resistor. Orange-Orange Dot.
L20	Peaking	6Ω		24K780388		Wound on 1 Meg. resistor. Orange-Orange Dot.
L21	Peaking	6Ω		24K780388		Wound on 1 Meg. resistor. Orange-Orange Dot.
L22	Peaking	2Ω		24K780386		Wound on 1 Meg. resistor. Blue-Blue Dot.
L23	Peaking	6Ω		24K780388		Wound on 1 Meg. resistor. Orange-Orange Dot.
L24	1st Sound IF	.1Ω		24K484082		Complete with iron core.
L25	2nd Sound IF	5Ω		24K780019		Wound on 22KΩ resistor.
L26	3rd Sound IF	1Ω	.1Ω	24B780319		Complete, but less shield can.
L27	Disc.Trans.	.3Ω	.1Ω	24B471340		Complete, but less shield can.

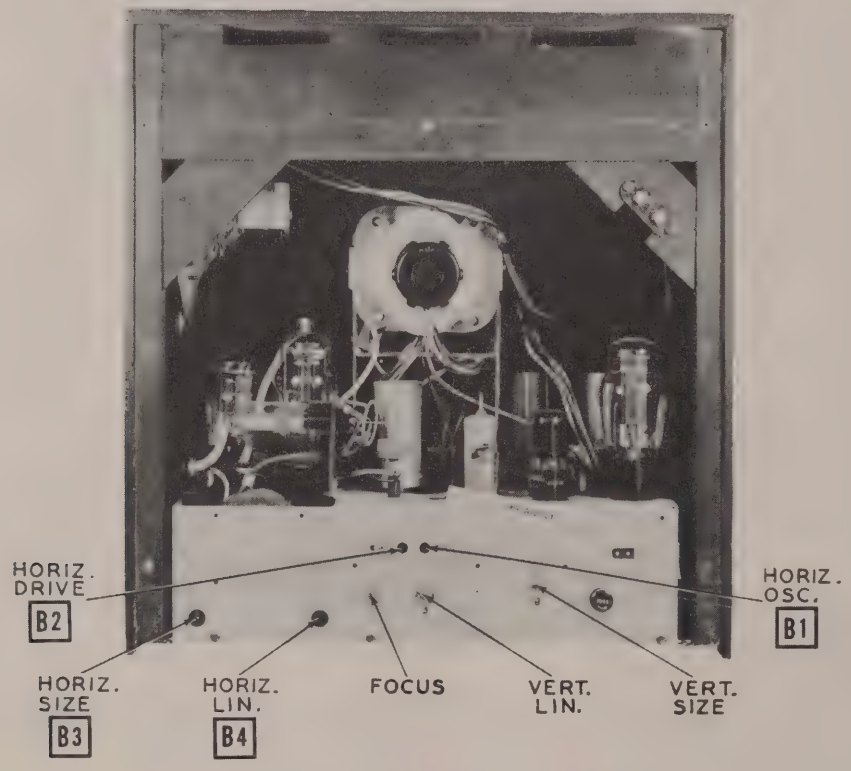
PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF) CONT.

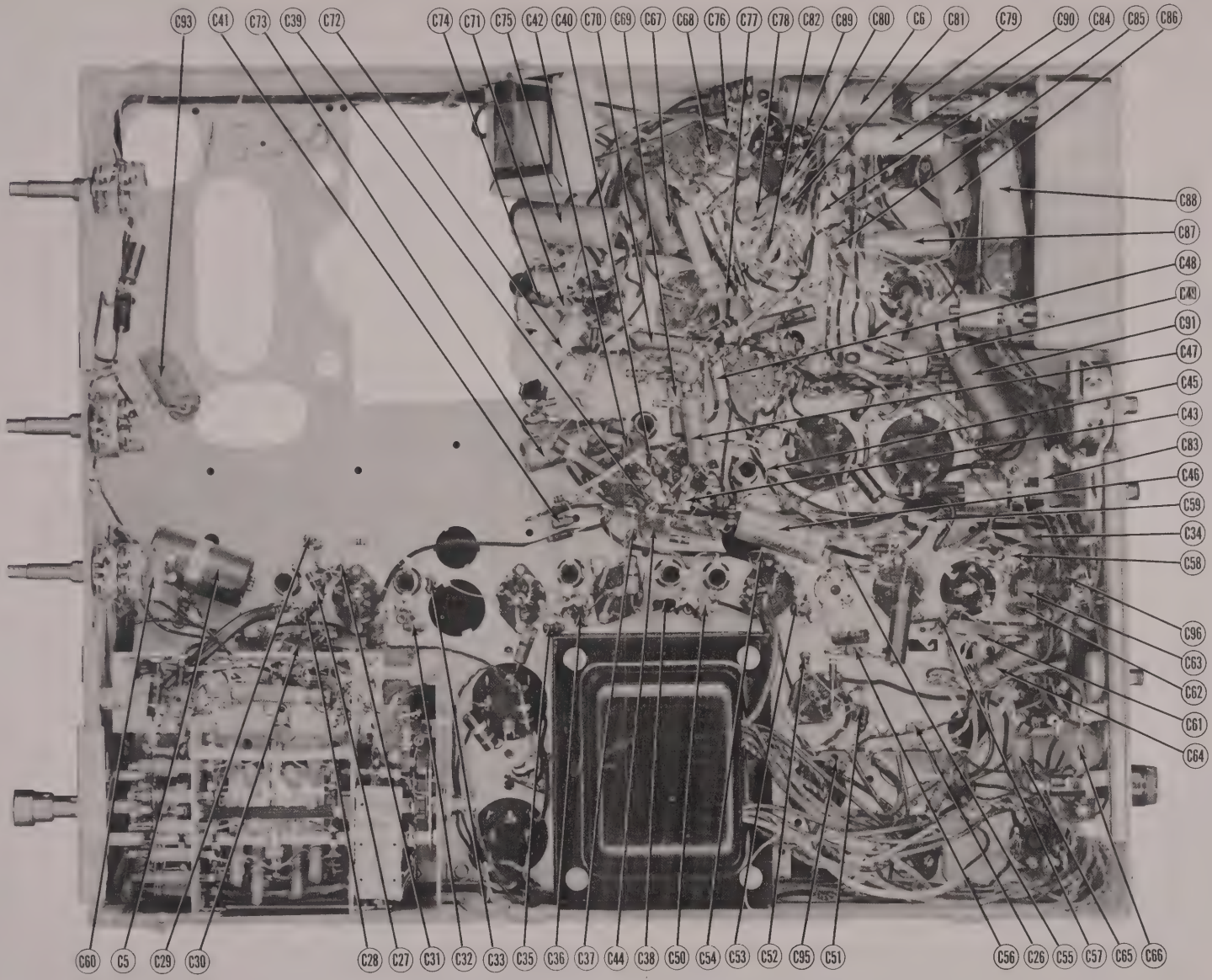
ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA MOTOROLA PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L28	Hor. Size	.2Ω		24K790689		Complete with iron core.
L29	Hor. Linearity	4Ω		24B470796		Complete with iron core.
L30	RF Choke	1Ω		24A780127		1 Microhenry.

MISCELLANEOUS

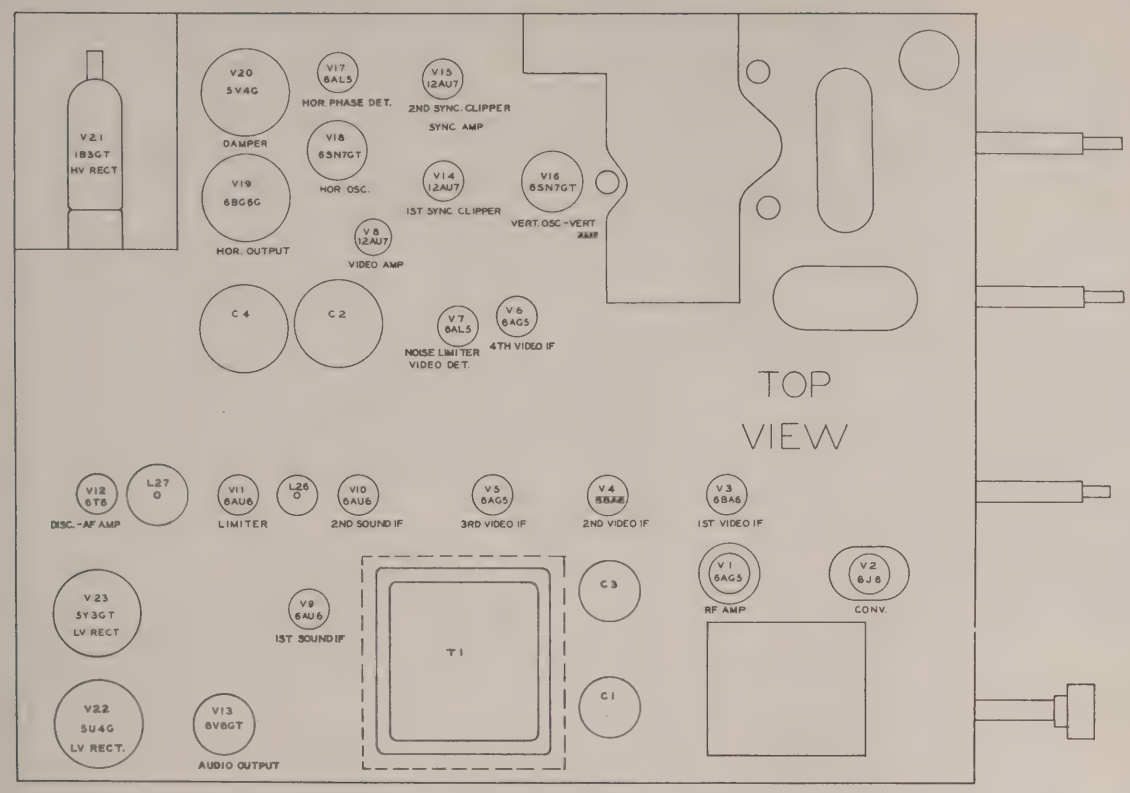
ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M1A	RF Tuner TT-3	1X484850	Complete
B	RF Tuner TT-5	1X790460	Complete
M2	Fuse	65K474899	Type AGC 1/8 Amp.
M3	Ion Trap	24B484822	PM
	Core	46K471143	Iron and Screw for L29
	Core	46A780344	Iron-Ceramic and screw for L28
	Core	46A70023	Iron and screw for L9, L11, L14 and L7 and L18
	Core	46K471337	Iron and screw for L27 primary and secondary & L24
	Core	46A484198	Iron: Threaded for L26 primary and secondary
	Back Cover	1X780413	Includes line cord and shield for model 12VT16
	Cabinet	16K790414	Table model, red mahogany model 12VT16R
	Cabinet	16K790415	Consolette, limed oak model 12VT16B
	Back Cover	1X790096	Includes line cord and shield assy. for model 10VK9
	Cabinet	16K790047	Table Model: Red mahogany, model 10VT3R
	Cabinet	16K790051	Table model: limed oak, model 10VT3B
	Cabinet	16K790048	Console: red mahogany, model 10VK9R
	Cabinet	16K790411	Console limed oak, model 10VK9B
	Safety Glass	1X790523	Includes rubber gasket, for model 12VT16
	Safety Glass	1X790009	Includes rubber gasket, for model 10VT3
	Safety Glass	1X790095	Includes rubber gasket, for model 10VK9
	Knob	36B489176	Channel Selector, Mahogany plastic model 12VT16R
	Knob	36B489179	Vert. hold mahogany plastic model 12VT16R
	Knob	36B485489	Contrast and volume mahogany plastic model 12VT16R
	Knob	36A790050	Brightness, Horiz. hold and off-tone mahogany plastic model 12VT16R.
	Knob	36A790005	Fine tuning, mahogany plastic, model 12VT16R
	Knob	36K489178	Channel Selector tan plastic model 12VT16B
	Knob	36K489178	Vert. hold tan plastic, model 12VT16B
	Knob	36K485491	Contrast and volume, tan plastic model 12VT16B
	Knob	36K790433	Brightness, Hor. hold and off-tone, tan plastic, model 12VT16B
	Knob	36K790432	Fine tuning, tan plastic model 12VT16B
	Knob	36A790050	Brightness, Hor. hold and off-tone, mahogany plastic for models 10VT3R and 10VK9R
	Knob	36K790433	Brightness, Hor. hold and off-tone, tan plastic for models 10VT3B and 10VK9B
	Knob	36A790005	Fine tuning, mahogany plastic for models 10VT3R and 10VK9R
	Knob	36K790432	Fine tuning, tan plastic for models 10VT3B and 10VK9B

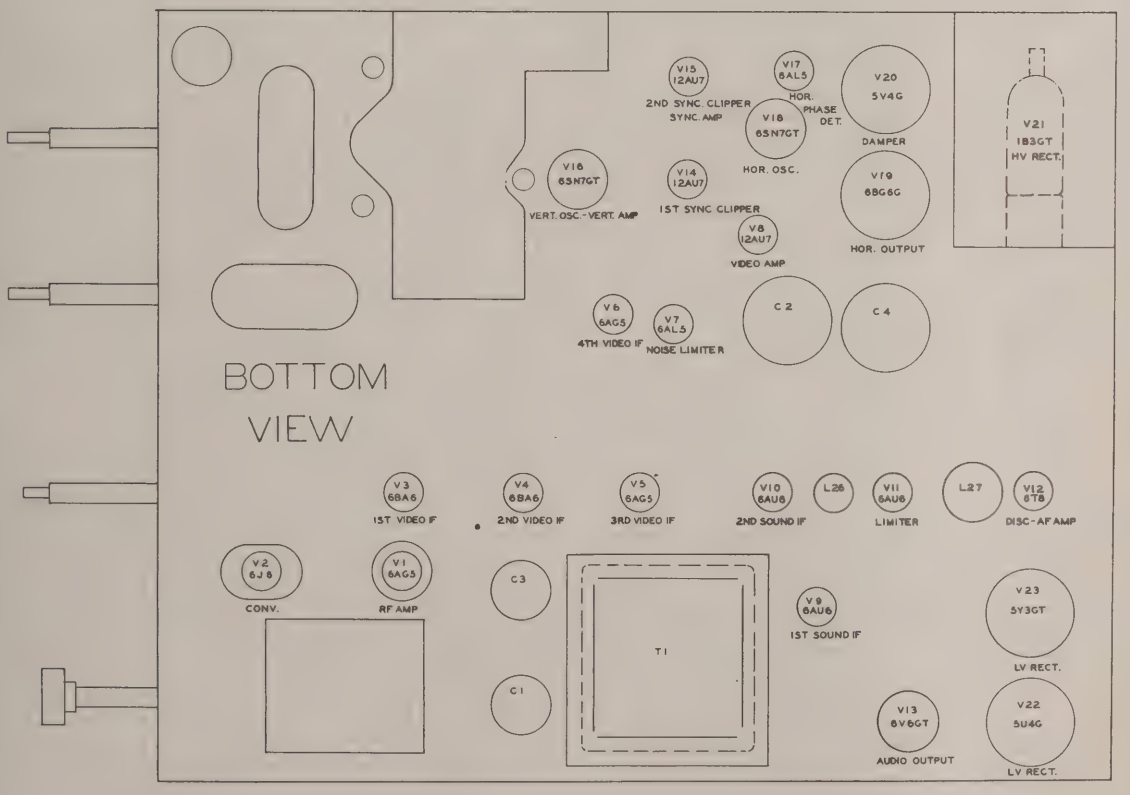


CABINET-REAR VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION





TUBE PLACEMENT CHART

HORIZONTAL OSCILLATOR ADJUSTMENTS

Tune in a station and turn the vertical hold control to sync the picture vertically.

Turn the horizontal hold control to the mid-position of its range.

Adjust the horizontal oscillator adjustment (B1) to the center of the range over which the picture syncs as B1 is adjusted.

Adjust the horizontal drive trimmer (B2) for the best compromise between brightness and horizontal linearity.

Adjust the horizontal size adjustment (B3) until picture fills the mask horizontally.

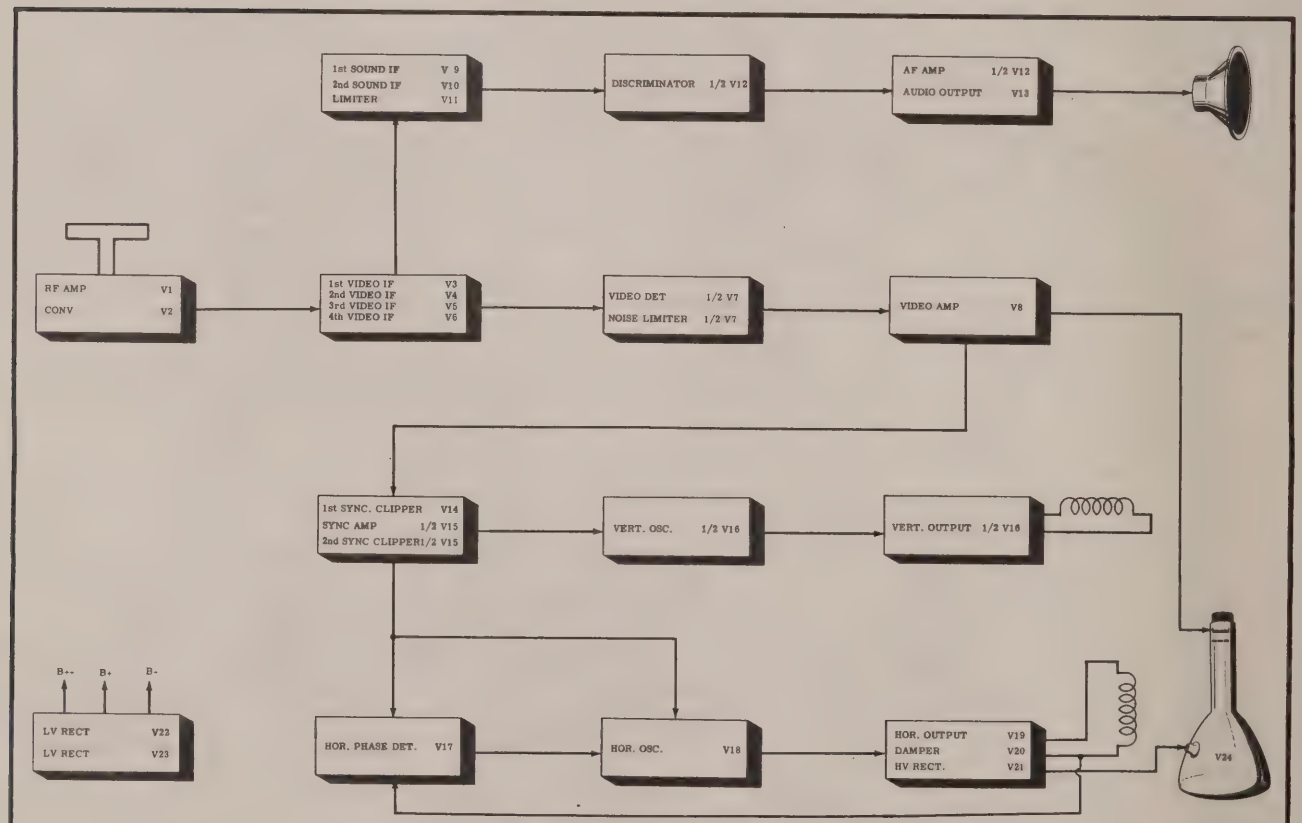
Adjust the horizontal linearity adjustment (B4) for best horizontal linearity.

The adjustments B3 and B4 are interacting and will need to be adjusted alternately for best results.

Center the picture by means of the adjusting screws on the focus coil.

DISASSEMBLY INSTRUCTIONS

1. Loosen 2 screws holding channel selector knob. Remove knob.
2. Remove three push-on type control knobs.
3. Remove ten screws holding rear cover over TV chassis.
4. Disconnect speaker plug at speaker.
5. Remove two screws holding antenna terminals to top right rear corner of cabinet.
6. Remove four 3/8" hex head bolts holding TV chassis to cabinet.
7. Slide cabinet forward to clear control shafts and lift upwards off TV chassis.
8. Remove four 5/16" hex nuts holding speaker to cabinet. Remove speaker.



BLOCK DIAGRAM

MOTOROLA MODELS 49L11Q, 49L13Q (Ch. HS-183)

MOTOROLA MODELS 49L11Q, 49L13Q (Ch. HS-183)

MOTOROLA MODEL 49L11Q

TRADE NAME	Motorola, Models 49L11Q, 49L13Q (Chassis HS-183)
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago, Ill.
TYPE SET	Battery Operated Portable Superhetrodyne Receiver with Loop Antenna.
TUBES (Four)	Types 1R5 Converter, 1U4 IF Amp., 1U5 Det. -AVC - AF, 3S4 Power Output.
POWER SUPPLY	1.5 Volts "A" Supply and 67.5 Volts "B" Supply
RATINGS	250 MA @ 1.5 Volts DC and 8.6 MA @ 67.5 Volts DC
TUNING RANGE—BROADCAST	535 - 1620 KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in the cabinet.

Volume control should be set at maximum. Output of signal generator generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1 Mfd.	High side to stator of rear section of tuning gang. Low to chassis.	455KC (400∿ Mod.)	Tuning gang fully open.	Across Voice Coil	A1, A2, A3	Adjust for maximum output.
2.	.1 Mfd.	"	1620KC (400∿Mod.)	"	"	A4	" " " "
3.		Loop	1400KC (400∿Mod.)	Tune for max. signal.	"	A5	Replace set in cabinet. Fashion loop of several turns of wire and radiate signal into loop of receiver. A5 is accessible thru the hole in the bottom of the cabinet. Adjust for maximum output.

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PARTS LIST AND DESCRIPTIONS

MOTOROLA
MODEL 49L11Q

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		MOTOROLA PART No.	STANDARD REPLACEMENT		
V1	Converter	1R5	1R5	7AT	
V2	IF Amp.	1U4	1U4	6AR	
V3	Det.-AVC-AF	1U5	1U5	6BW	
V4	Power Output	3S4	3S4	7BA	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1	10	100	23A75235	PRS150/12	BR1215		UT-121	RF Bypass
C2	.05	100	8A71213	P285-05	ZYW1S5		68P16	AVC Filter
C3	.02	100	8K471628	P285-02	ZYW1S3		68P15	Osc. Anode Coupling
C4	.02	100	8K471628	P285-02	ZYW1S3		68P15	RF Bypass
C5	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	Diode RF Filter
C6	.006	100	8C4529	P285-006	ZZW1D6	GP2M-0056	68P12	Audio Coupling
C7	.02	100	8K471628	P285-02	ZYW1S3		68P15	AF Screen Bypass
C8	.006	100	8C4529	P285-006	ZZW1D6	GP2M-0056	68P16	Audio Coupling
C9	.006	100	8C4529	P285-006	ZZW1D6	GP2M-0056	68P16	Output Plate Bypass
C10	100		21B77286	1468-0001	5W5T1	GP1K-100	1FM-31	AF Plate Bypass

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	CLAROSTAT PART No.	
R1A	1 Meg.	½	18K480039	Q13-137	15/16-63-Z	Volume Control
B	Switch		Not Req.	76-2 *	DPST Sw.#	* Attach to R1A Per Instructions # Attached at factory.

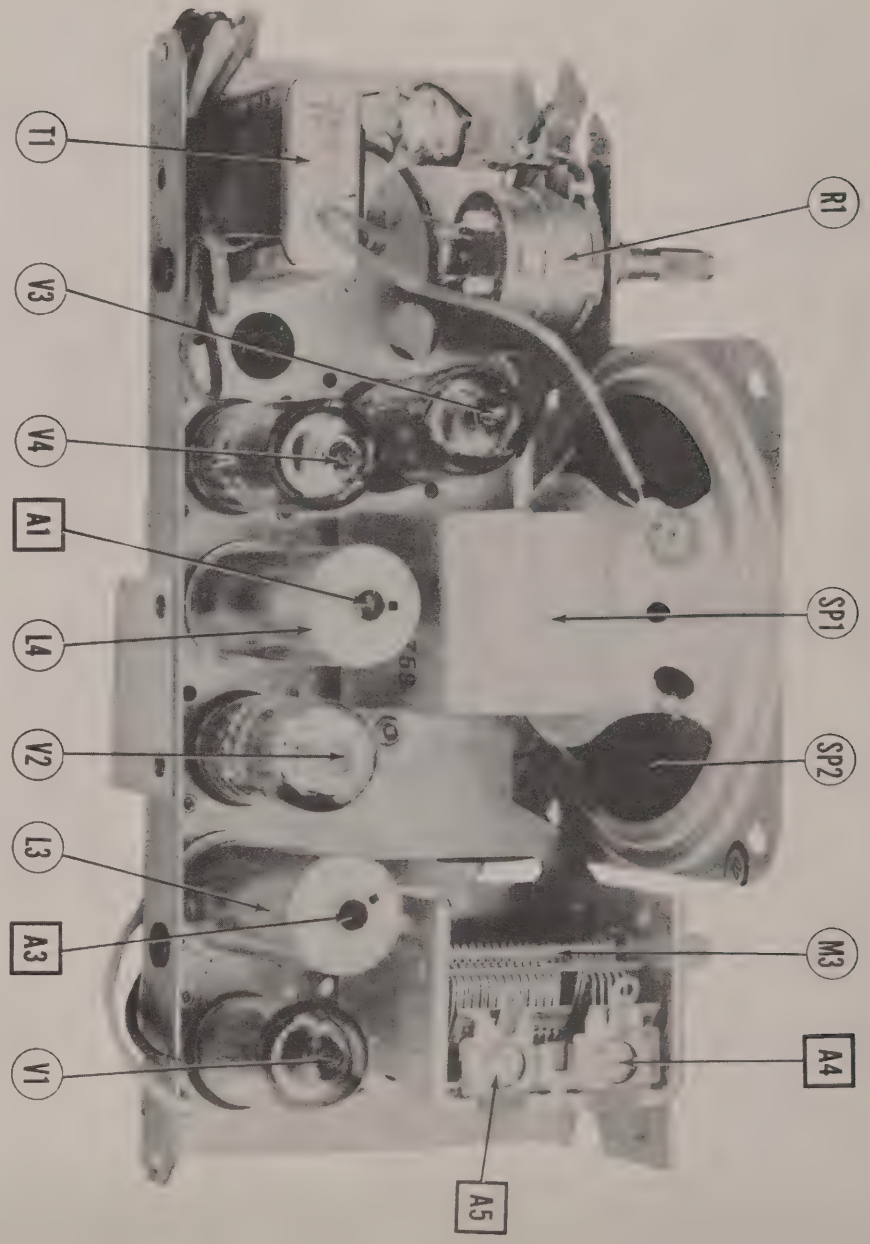
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	MOTOROLA PART No.	IRC PART No.	
R2	100KΩ	½	6R6031	BTS-100K	Oscillator Grid
R3	22KΩ	½	6R6397	BTS-22KΩ	Oscillator Anode Decoupling
R4	3.3 Meg	½	6R2118	BTS-3.3 Meg	AVC Network
R5	10 Meg	½	6R2109	BTS-10 Meg	AF Grid
R6	4.7 Meg	½	6R2122	BTS-4.7 Meg	AF Screen
R7	1 Meg	½	6R6004	BTS-1 Meg	AF Plate
R8	3.3 Meg	½	6R2118	BTS-3.3 Meg	Output Grid
R9	820Ω	½	6R6269	BTS-820Ω	Bias Network

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		MOTOROLA PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	6500Ω	3.1Ω	360Ω	.4Ω	25B470622	A-3329 †	A-2927 †	RO-11 †	† Bend mounting tabs down and mount on chassis.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA: MOTOROLA PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
SP1	FIELD PM	V.C. IMP. 3.1Ω	50B482759		3A07	Alternate Part No. 50B480048
SP2	CONE DIA. 3 1/4"	V.C. DIA. 9/16"				

R F COILS

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: MOTOROLA PART No.	MEISSNER PART No.	
L1	Loop Ant.	3Ω		24B480092		Includes panel.
L2	Osc. Coil	3Ω	13Ω	24A485989		
L3	Input IF	27Ω	27Ω	24B480042		Alternate Part No. 24B690840
L4	Output IF	.2Ω	50Ω	24B480040		

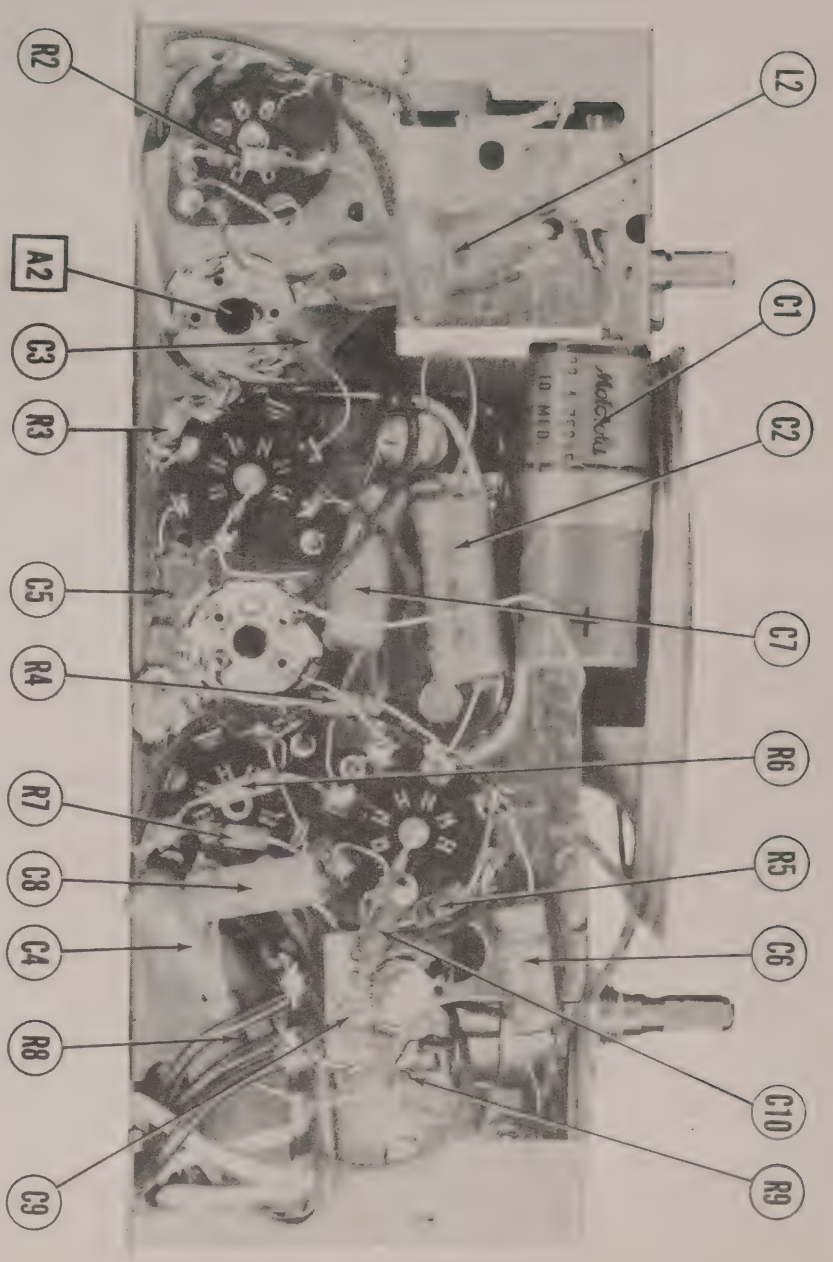
BATTERIES

ITEM No.	VOLTAGE	MOTOROLA PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M1 M2	1.5V "A" 67.5V "B"		950	467		2R	XX45		Two used in parallel

MISCELLANEOUS

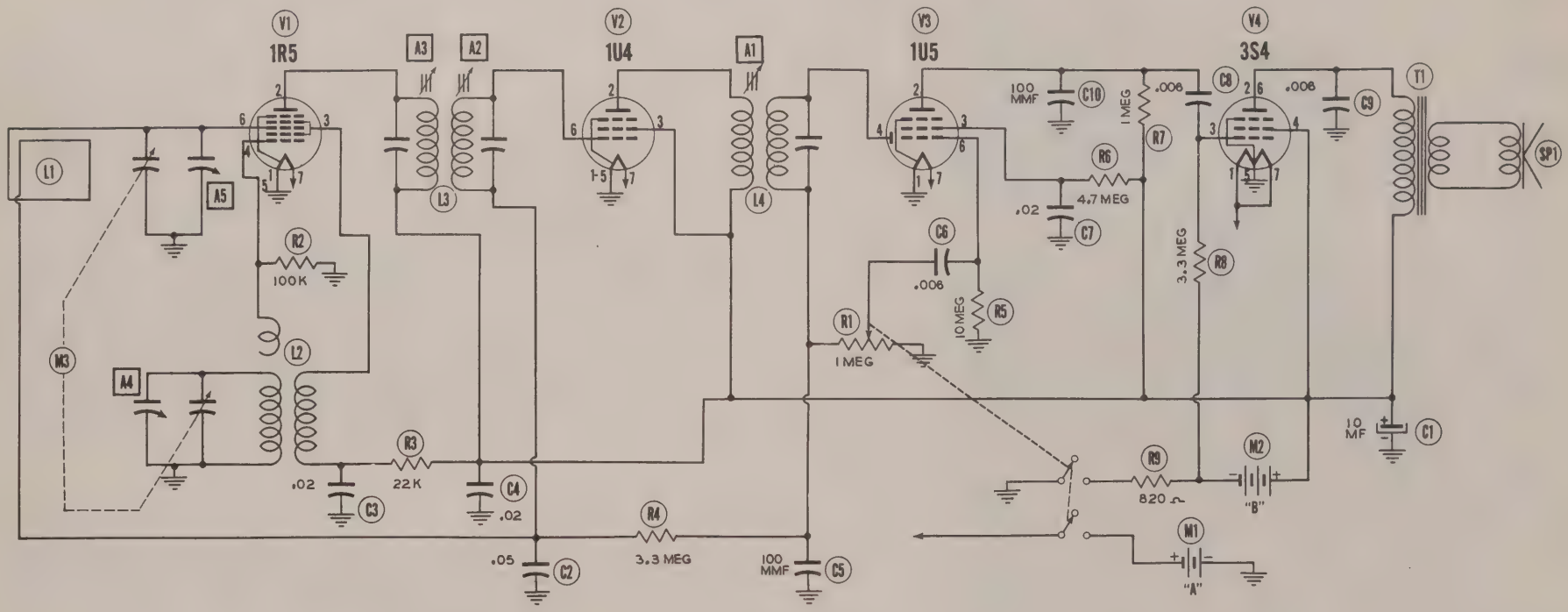
ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M3	2 Gang Var. Cap.	19K680360	(28-433 MMF, 16-105 MMF)
	Knob	36K690072	Model 49L11Q
	Knob	36K690148	Model 49L13Q
	Cabinet	1K690081	Model 49L11Q
	Cabinet	1K690491	Model 49L13Q

CHASSIS—BOTTOM VIEW



MOTOROLA MODEL 49L11Q

MOTOROLA MODEL 49L11Q



IF=455 KC

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	0V	57VDC	30VDC	§-3VDC	0V	-.1VDC	1.5VDC
V 2	1U4	0V	57VDC	57VDC	30VDC	0V	-.1VDC	1.5VDC
V 3	1U5	0V	20VDC	12VDC	-.1VDC	-.1VDC	-.1VDC	1.5VDC
V 4	3S4	1.5VDC	55VDC	-.7VDC	57VDC	0V	55VDC	1.5VDC

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	*	†27Ω	†22KΩ	100KΩ	*	4.3Meg.	*
V 2	1U4	*	†50Ω	†0Ω	†22KΩ	*	4.3Meg.	*
V 3	1U5	*	†1 Meg.	†4.7Meg.	1 Meg.	4.3Meg.	10 Meg.	*
V 4	3S4	*	†350Ω	♦3.3Meg.	†0Ω	*	†350Ω	*

*DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE.

† Measured from pin 4 of V4.

♦ Remove batteries and turn power switch to "On" position for this measurement.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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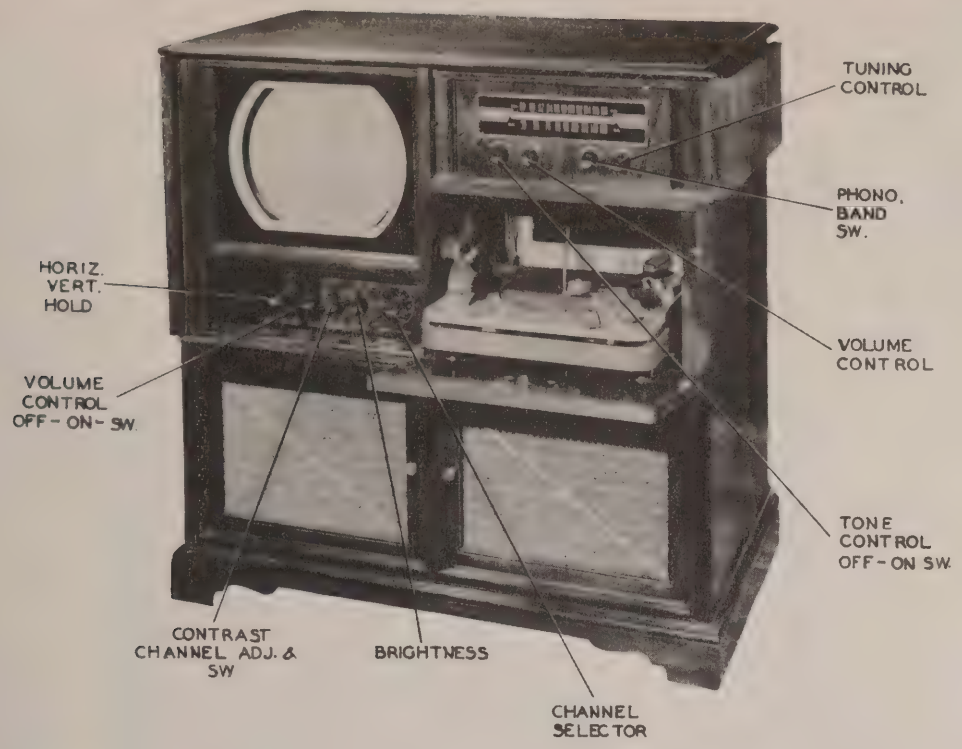
1 - DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ± 15 % in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)



PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)

TRADE NAME	Philco, Models 49-1450, 49-1475, 49-1480 (Codes 121 A or B, 123 A or B, 123T A or B)
MANUFACTURER	Philco Corp., Tioga and "C" Streets, Philadelphia, Pennsylvania
TYPE SET	AM-FM-TV-Phono Combination Receiver (Model 49-1450 TV only)
TUBES	Twenty Seven (Model 49-1450) Thirty Two (Models 49-1475 and 49-1480)
POWER SUPPLY	110-120 Volts AC 60 Cycle
TUNING RANGE	AM 540-1620KC, FM 88-108MC, TV "A" Codes-Channels 2, 3, 4, 5, 7, 9, 11, 13 "B" Codes-Channels 2, 3, 4, 5, 6, 8, 10, 12
RATING	2.04 Amp. @ 117 Volts AC (TV)-.57 Amp. @ 117 Volts AC (Radio)

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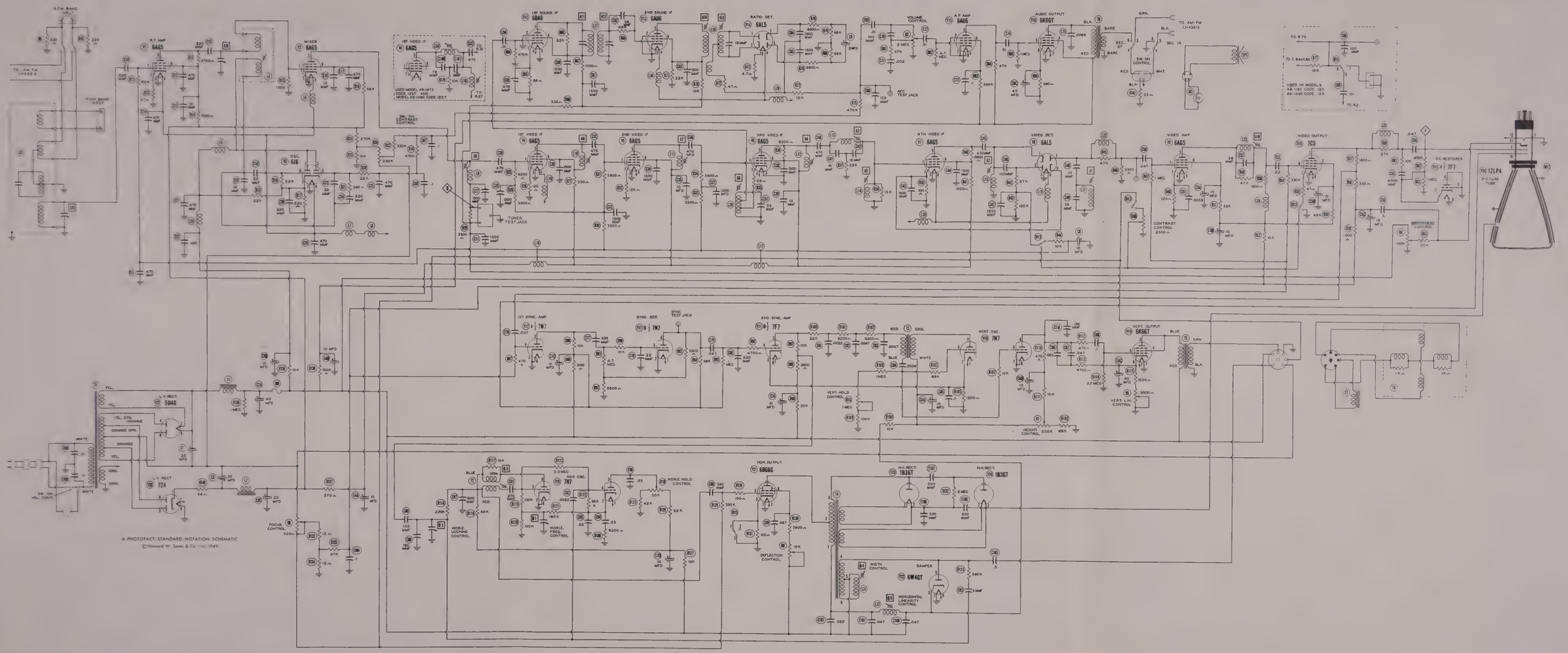
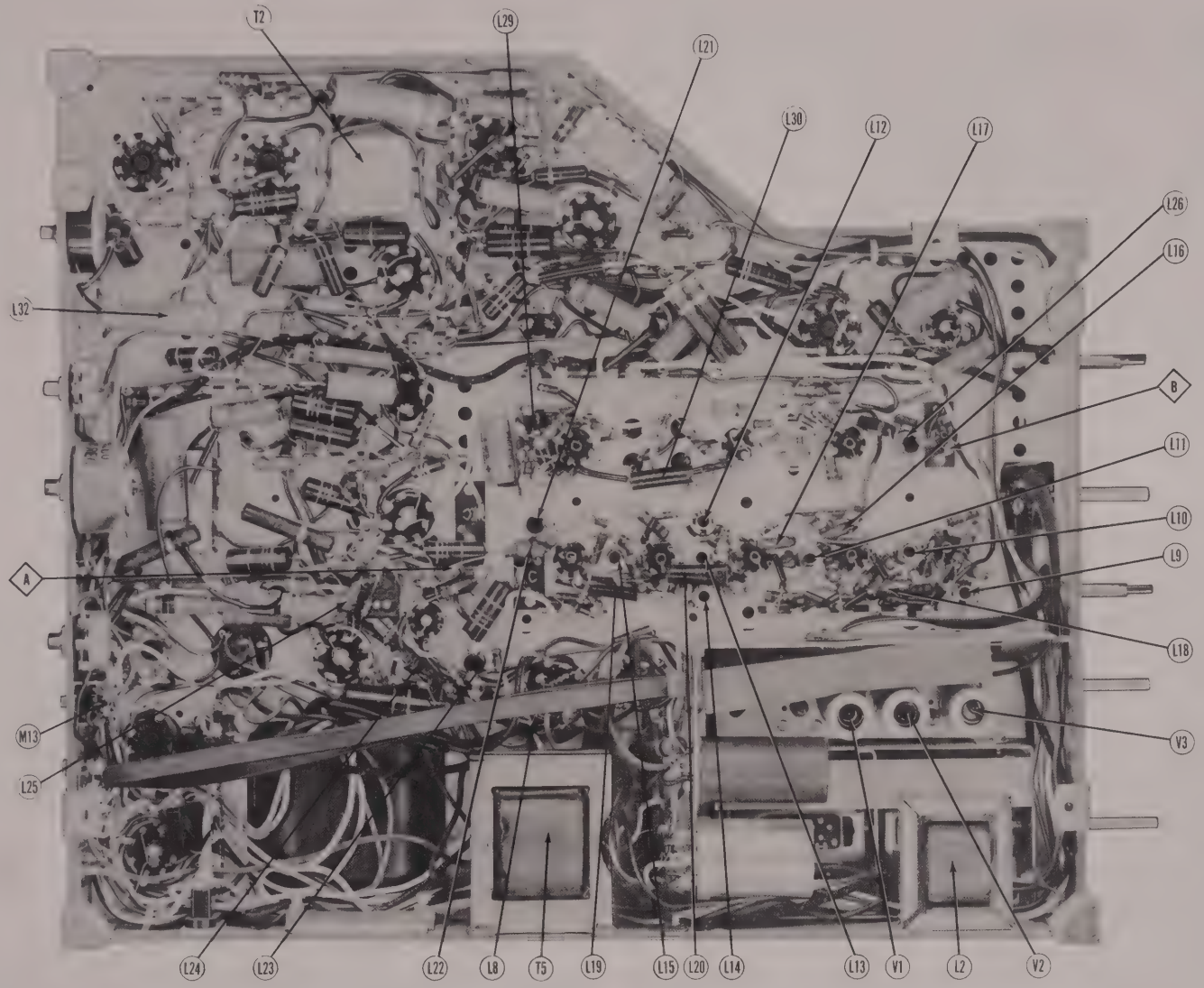
DATE 11/49 SET #77 FOLDER #8



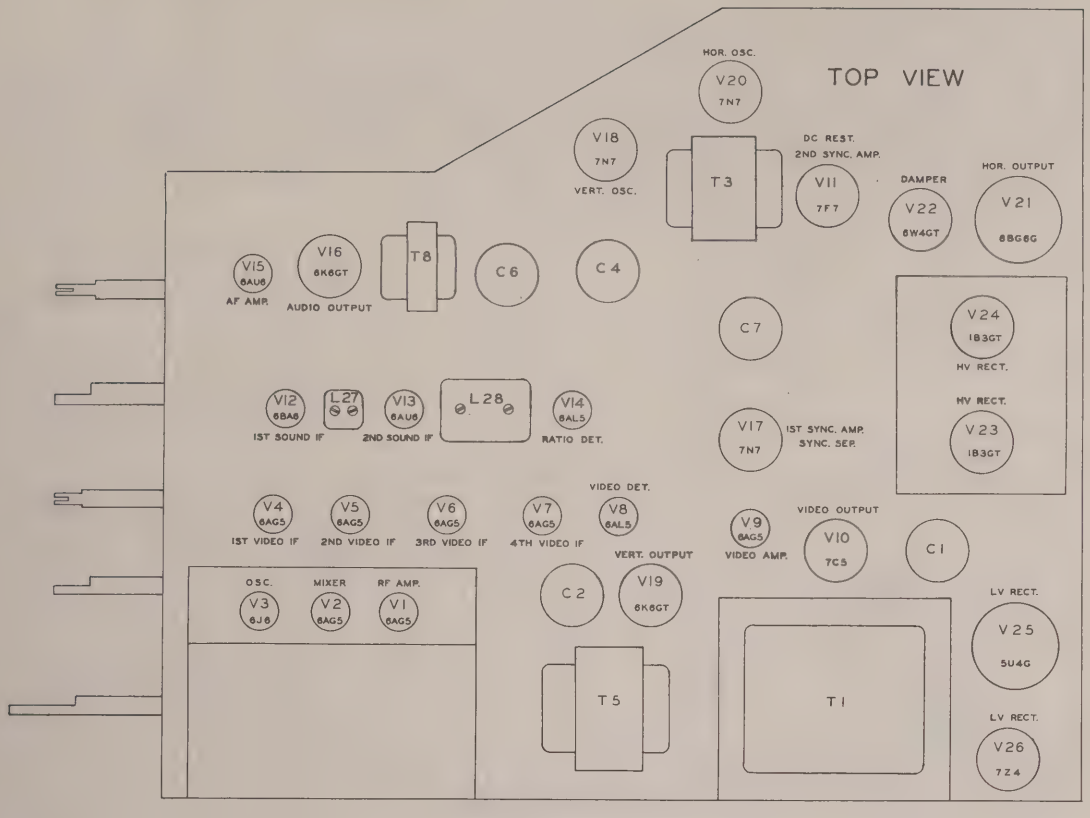
PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)

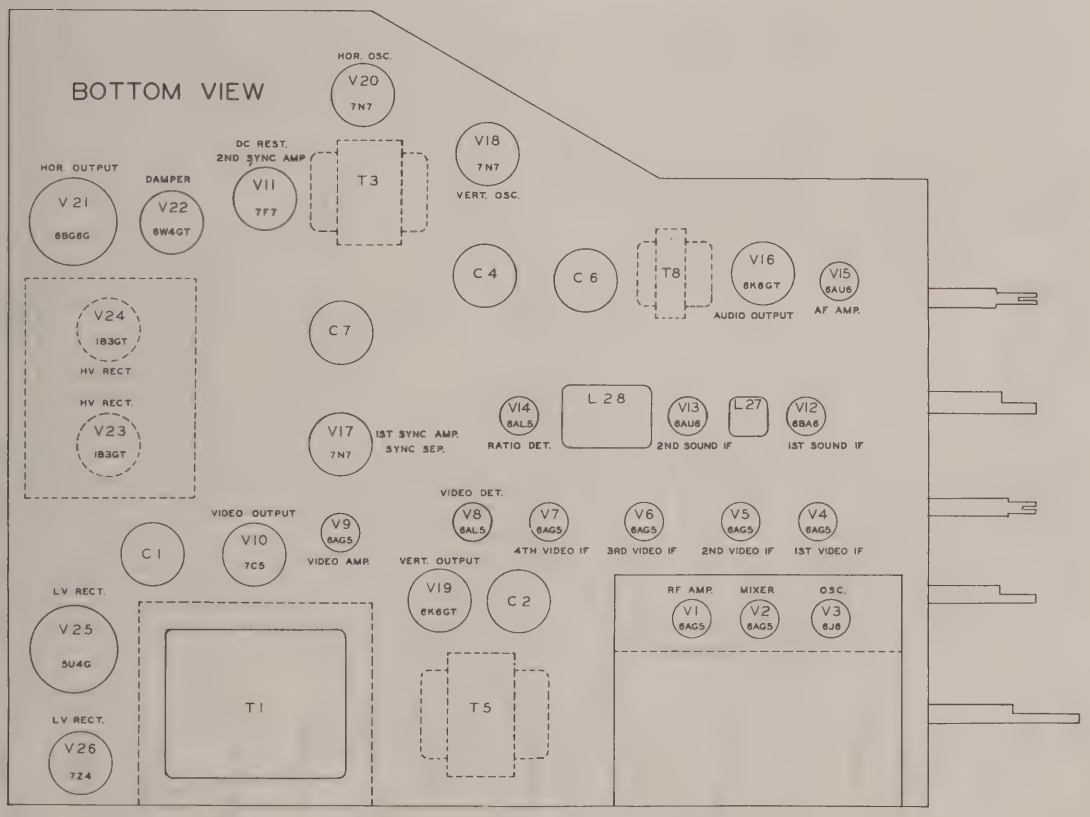
CHASSIS TOP VIEW

PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION





TUBE PLACEMENT CHART

TV-ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The plug connecting the picture tube focus and deflection assembly to the main chassis must be connected during alignment.

Remove the horizontal oscillator tube V20 to eliminate the high voltage shock hazard.

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

Connect a 10KΩ resistor in series with the vertical amplifier input of the oscilloscope.

Remove the local oscillator tube V3, to prevent erroneous indications.

Turn the AVC switch on the rear of the chassis to "off".

Turn the contrast control one fourth of a revolution counter-clockwise from its maximum clockwise position.

VIDEO IF ALIGNMENT

Pre-set A5 and A7 maximum counter-clockwise.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (Grid) of 6AG5 (V7). Low side to chassis.	Not used	22.1MC (400∿ Mod.)	Any	Vert. Amp. thru 10KΩ to "align test" jack. Low side to chassis.	A1	Adjust for MINIMUM 400∿ response on scope.
2.	.01MFD	"	25MC (10MC Sweep)	23MC 28MC	"	"	A2	Adjust for response curve similar to Fig 1 with markers as shown.
3.	.01MFD	High side to pin 1 (Grid) of 6AG5 (V6). Low side to chassis.	Not used	28.1MC (400∿ Mod.)	"	"	A3	Adjust for MINIMUM 400∿ response on scope.
4.	.01MFD	"	25MC (10MC Sweep)	23.9MC 26MC	"	"	A4,A5	Adjust A4 for the peak at 23.9MC. Then adjust A5 and A4 for response similar to Fig 2.
5.	.01MFD	High side to pin 1 (Grid) of 6AG5 (V5). Low side to chassis.	Not used	22.1MC (400∿ Mod.)	"	"	A6	Adjust for minimum 400∿ response on scope.
6.	.01MFD	"	25MC (10MC Sweep)	23.5MC 27MC	"	"	A7	Adjust for response curve similar to Fig 3.
7.	.01MFD	High side to pin 1 (Grid) of 6AG5 (V4). Low side to chassis.	"	24.2MC 26.6MC	"	"	A8	Adjust for response curve similar to Fig 4.
8.	.01MFD	High side to ungrounded tube shield floating over mixer tube V2. Low side to chassis.	"	23MC 24MC 25.2MC 26.6MC	"	"	A9	Adjust for response as per Fig 5 with markers as shown. Note the possible variation. If necessary SLIGHTLY retouch A2, A4, A5, A6, A7, A8 and A9 in order to obtain proper response.

In those sets that have code No. 123T, the traps A1 and A3 have been interchanged, therefore on those sets A1 is adjusted at the frequency given for A3, 28.1MC, and A3 is adjusted at 22.1MC, the frequency given A1. Also incorporated in the code 123T sets is an additional trap, located in the plate circuit of the first video amplifier. This is an adjacent sound trap and is adjusted for minimum response at 28.1MC.

4.5MC TRAP ADJUSTMENT

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to pin 1 (Grid) of 6AG5 (V9). Low side to chassis.	Not used	4.5MC (400∿ Mod.)	Any	Vert. Amp. to Point (A) Low side to chassis.	A10	Adjust for MINIMUM 400∿ response. If a wide band scope is not available a VTVM and RF probe may be used.

SOUND IF ALIGNMENT

Pre-set A11 and A12 fully clockwise.

For models having the "channel-adjust" control, turn the control fully counter-clockwise until the control is off. This is necessary to assure accurate sound IF alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	.01MFD	High side to pin 1 (Grid) of 6AG5 (V5). Low side to chassis.	22.1MC (2MC Sweep)	22.1MC (400∿ Mod.)	Any	Vert. Amp. thru 10KΩ to "AFC test" jack. Low side to chassis.	A11,A12	Adjust A11 and A12 slightly counter-clockwise until an indication appears on the oscilloscope.
11.	.01MFD	"	"	"	"	"	A13	Adjust for MINIMUM 400∿ response on scope.
12.	.01MFD	"	"	22.1MC (Unmod.)	"	"	A14	Adjust for response curve similar to Fig 6.
13.	.01MFD	"	"	"	"	"	A11,A12	Adjust for maximum amplitude and symmetry as per Fig 6.

OSCILLATOR ALIGNMENT

Replace the local oscillator tube. Turn the channel switch to the channel to be adjusted. While receiving a TV station, connect a VTVM between the "AFC test" jack and chassis. Turn the oscillator adjustment screw until the VTVM reads zero. This screw is reached thru a hole in the front of the tuner, to the left of the channel switch shaft. If a TV signal is not available, a RF signal at the sound carrier frequency of the desired channel may be used. On those sets having a "channel-adjust" control, turn the control fully counter-clockwise until a click is heard. This turns the "channel-adjust" control off.

RF & MIXER ALIGNMENT

The RF and mixer adjustments, A15 and A16 are pre-set at the factory to compensate for variations in circuit capacity. They should be adjusted only after a change of tubes or some component part. If adjustment becomes necessary, they should be adjusted at the highest frequency channel normally used. Connect the oscilloscope to Point B thru a detector probe and isolating capacitor.

Connect a sweep generator to the antenna terminals. Set the generator to sweep the desired channel. Adjust A15 and A16 for a symmetrical response curve.

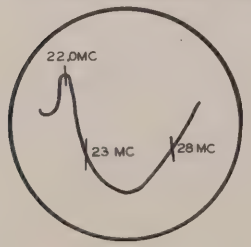


FIG. 1

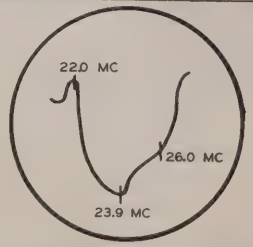


FIG. 2

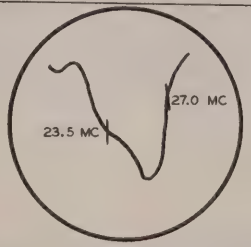


FIG. 3

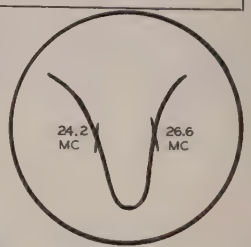


FIG. 4

RADIO ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-.

To set the dial pointer, turn the tuning gang fully closed and set pointer 3 11/16" to the right of the left hand end of the dial backplate.

AM ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
14	.1MFD	High side to terminal 1 of AM antenna terminal strip. Low side to B-.	455KC (400~ Mod.)	BC (max. clockwise)	Tuning gang fully closed	Across terminals 2 and 3 of AM antenna terminal strip.	A17, A18, A19, A20, A21, A22	Adjust slugs in the order given for maximum output. DO NOT repeat adjustments. If isolation transformer is not used reduce dummy antenna to .001MFD to reduce hum modulation.
15		Loop	1600KC (400~ Mod.)	"	Set pointer 9 7/16" to the right of the left hand end of dial backplate.	"	A23	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
16		Loop	1500KC (400~ Mod.)	"	Set pointer 9 1/16" to the right of the left hand end of dial backplate.	"	A24	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 100KΩ (± 1%) resistors in series from Point Ⓒ to B-. The junction of these two resistors is alignment Point Ⓔ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
17	.1MFD	High side to pin 1 (Grid) of 6BJ6 (V30). Low side to B-.	9.1MC (Unmod.)	FM (center pos.)	Tuning gang fully closed	DC Probe to Point Ⓒ Common to B-.	A25, A26, A27, A28	Adjust for maximum deflection. Repeat the adjustments in order until no further increase is noted.
18	.1MFD	High side to pin 8 (Grid) of 14F8 (V28). Low side to B-.	"	"	"	"	A29, A30	Adjust for maximum deflection.
19	.1MFD	"	"	"	"	DC Probe to Point Ⓓ Common to Point Ⓔ	A25	Adjust for zero reading. A positive and negative reading will be obtained on either side of correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
17	.1MFD	High side to pin 1 (Grid) of 6BJ6 (V30). Low side to B-.	9.1MC (450KC Sweep)	FM	Tuning gang fully closed	Vert. Amp. to Point Ⓒ Low side to B-.	A26, A27, A28	Disconnect stabilizer capacitor C113. Adjust for maximum amplitude and symmetry as per Fig 7.
18	.1MFD	High side to pin 8 (Grid) of 14F8 (V28). Low side to B-.	"	"	"	"	A29, A30	Adjust for maximum amplitude and symmetry as per Fig 7.
19	.1MFD	"	"	"	"	Vert. Amp. to Point Ⓓ Low side to B-.	A25, A26	Reconnect capacitor C113. Adjust A25 so 9.1MC occurs at center of crossover lines as per Fig 8. SLIGHTLY retouch A26 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
20	Direct	High side to pin 2 of FM antenna socket. Low side to chassis.	105MC (Unmod.)	FM	Set pointer 8 7/16" to the right of the left hand end of dial backplate.	DC Probe to Point Ⓒ Common to B-.	A31	Adjust for maximum deflection.
21	Direct	"	"	"	"	"	A32, A33	"
22	Direct	"	92MC (Unmod.)	"	Set pointer 1 3/8" to the right at the left hand end of dial backplate.	"	A34	Expand or compress coil turns for maximum deflection.
23	Direct	"	"	"	"	"	A35	"

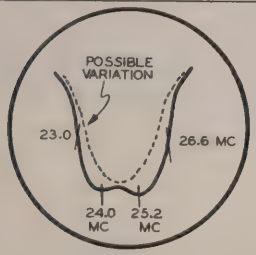


FIG. 5

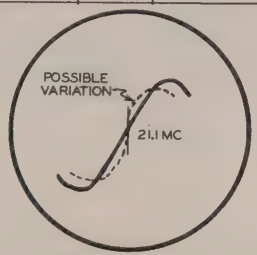


FIG. 6

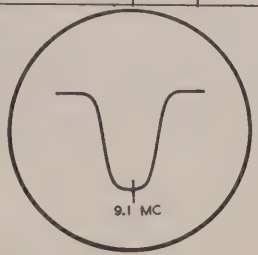


FIG. 7

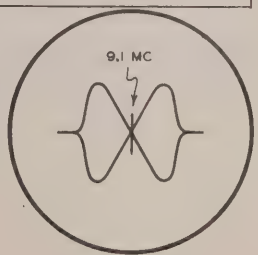


FIG. 8

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	-.3VDC	.4VDC	0V	6.3VAC	117VDC	142VDC	.4VDC		
V 2	6AG5	-1.5VDC	0V	6.3VAC	0V	125VDC	90VDC	0V		
V 3	6J6	110VDC	110VDC	0V	6.3VAC	§ -18VDC	-.1VDC	3.6VDC		
V 4	6AG5	-.1VDC	1.3VDC	0V	6.3VAC	130VDC	130VDC	1.3VDC		
V 5	6AG5	-.1VDC	1.3VDC	0V	6.3VAC	132VDC	132VDC	1.3VDC		
V 6	6AG5	-.1VDC	.8VDC	0V	6.3VAC	132VDC	132VDC	.8VDC		
V 7	6AG5	0V	1VDC	0V	6.3VAC	77VDC	125VDC	1VDC		
V 8	6AL5	0V	0V	0V	6.3VAC	1VDC	0V	-.3VDC		
V 9	6AG5	0V	.9VDC	6.3VAC	0V	220VDC	145VDC	.9VDC		
V 10	7C5	0V	250VDC	110VDC	-2.5VDC	0V	-1.1VDC	1.2VDC	6.3VAC	
V 11	7F7	6.3VAC	5.3VDC	150VDC	5.3VDC	0V	0V	2.6VDC	0V	
V 12	6BA6	0V	0V	0V	6.3VAC	112VDC	112VDC	.9VDC		
V 13	6AU6	-.3VDC	0V	0V	6.3VAC	50VDC	50VDC	0V		
V 14	6AL5	-2VDC	-1.4VDC	1.2VAC	6.3VAC	5.8VDC	0V	-2VDC		
V 15	6AU6	-.4VDC	0V	0V	6.3VAC	205VDC	37VDC	0V		
V 16	6K6GT	0V	6.3VAC	250VDC	255VDC	0V	255VDC	0V	20VDC	
V 17	7N7	6.3VAC	0V	145VDC	-1.2VDC	-3.2VDC	32VDC	0V	0V	
V 18	7N7	6.3VAC	5.3VDC	380VDC	-90VDC	-90VDC	50VDC 265VDC	0V	0V	
V 19	6K6GT	0V	0V	310VDC	310VDC	0V	6.3VAC	6.3VAC	20VDC 40VDC	
V 20	7N7	6.3VAC	-15VDC	37VDC	-20VDC	-50VDC	155VDC	0V	0V	
V 21	6BG6G	0V	6.3VAC	0V	-20VDC	-20VDC	290VDC	0V	270VDC	TOP CAP *
V 22	6W4GT	0V	0V	395VDC	0V	310VDC	0V	0V	6.3VAC	
V 23	1B3GT	* DO NOT MEASURE								
V 24	1B3GT									
V 25	5U4G	0V	0V	325VDC	0V	360VDC	0V	360VDC	0V	325VDC
V 26	7Z4	6.3VAC	0V	210VDC	0V	0V	210VDC	165VDC	0V	
‡ V 27	12AU6	.4VDC	2.9VDC	43VAC	55VAC	200VDC	150VDC	4.1VDC		
‡ V 28	14F8	§-.2VDC	30VAC	85VDC	2.1VDC	4.6VDC	115VDC	18VAC	.2VDC	
V 29	12AU7	40VDC	§-3VDC	2.1VDC	43VAC	30VAC	120VDC	-1VDC	6.3VDC	36VAC
V 30	6BJ6	0V	2.6VDC	55VAC	60VAC	140VDC	140VDC	2.1VDC		
V31	6BJ6	0V	.8VDC	60VAC	66VAC	190VDC	120VDC	0V		
V32A	19T8	-.5VDC	-1.1VDC	-.5VDC	0V	18VAC	-.7VDC	0V	-.7VDC	65VDC
‡ V32B	19T8	-.5VDC	-2VDC	-.6VDC	0V	18VAC	-.7VDC	0V	-.7VDC	65VDC
V33	5OC6G	0V	117VAC	190VDC	150VDC	0V	0V	66VAC	12VDC	
V34	12LP4	0V	1.4VDC	PIN 10 250VDC	PIN 11 130VDC	PIN 12 6.3VAC				

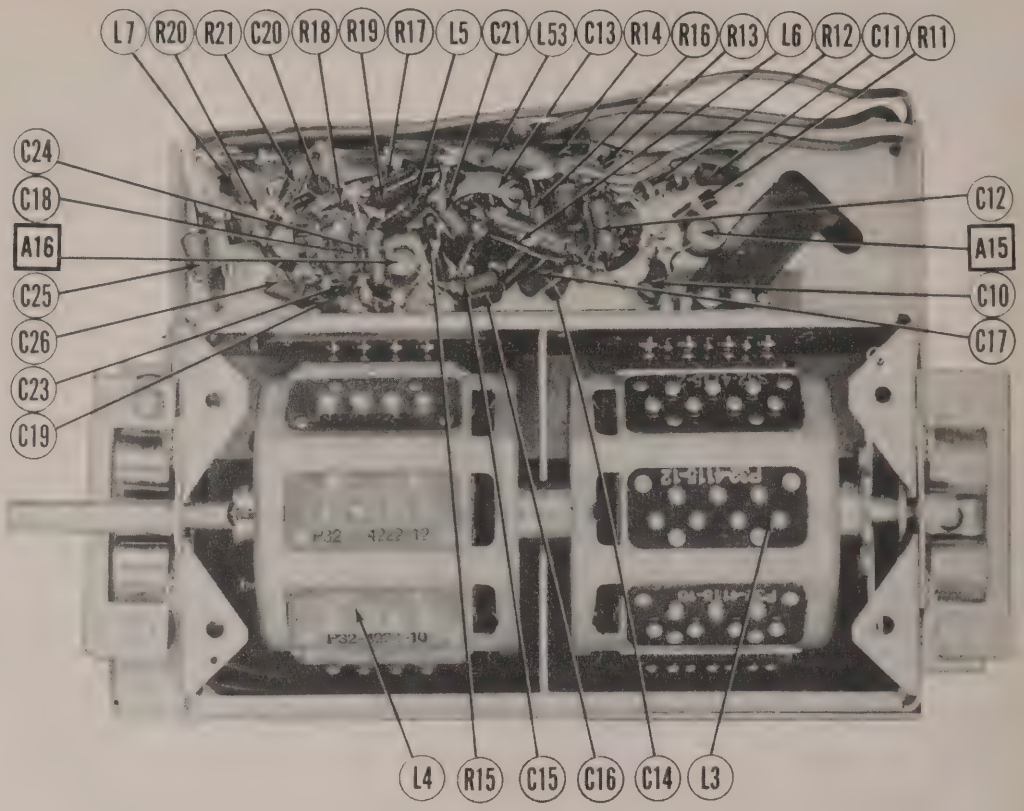
§ Taken with vacuum tube voltmeter.
* Do not measure
‡ Taken in FM position.
Note 1. AVC switch in off position for these measurements.
Note 2. The voltage reading at pin 5 of V3 will be different on sets not having electronic fine tuning.
Note 3. Contrast control set at maximum for these readings.

RESISTANCE READINGS

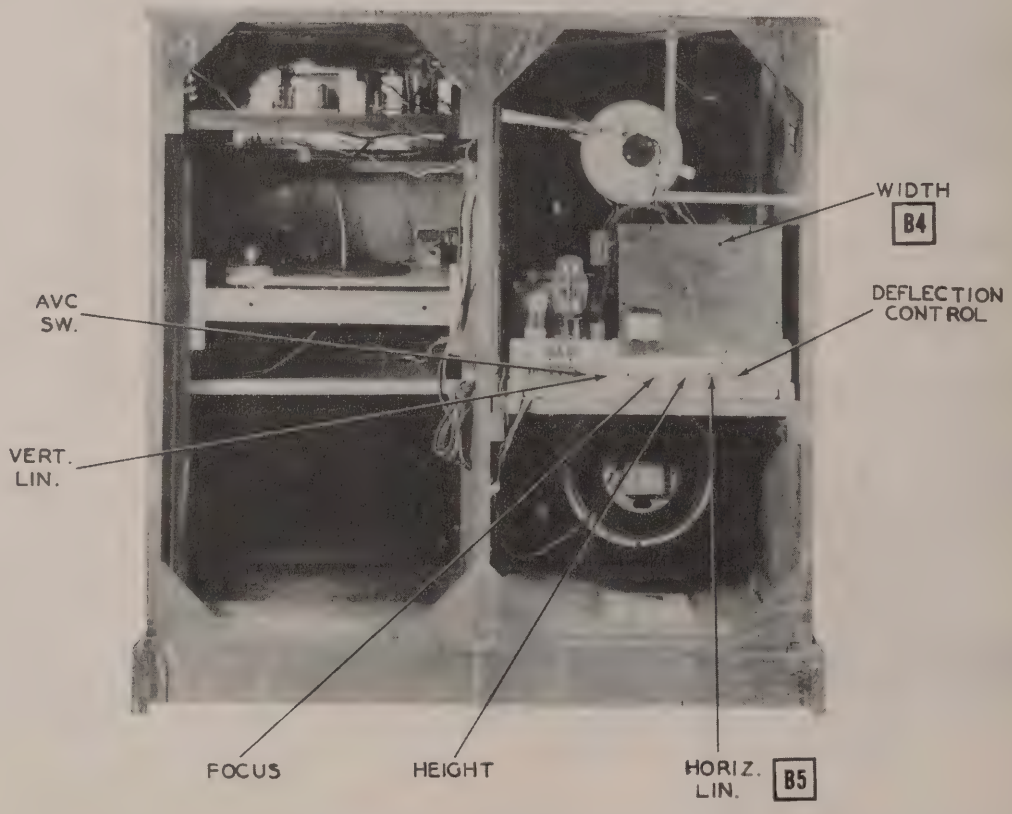
Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AG5	110KΩ	47Ω	0Ω	.1Ω	†4KΩ	†1KΩ	47Ω		
V 2	6AG5	100KΩ	0Ω	.1Ω	0Ω	†4KΩ	†56KΩ	0Ω		
V 3	6J6	♯10KΩ	♯10KΩ	0Ω	.1Ω	1 Meg.	22KΩ	220Ω		
V 4	6AG5	24KΩ	120Ω	0Ω	.1Ω	†750Ω	†750Ω	120Ω		
V 5	6AG5	18KΩ	120Ω	0Ω	.1Ω	†460Ω	†460Ω	120Ω		
V 6	6AG5	18KΩ	68Ω	0Ω	.1Ω	†460Ω	†460Ω	68Ω		
V 7	6AG5	.1Ω	100Ω	0Ω	.1Ω	†8KΩ	†1.5KΩ	100Ω		
V 8	6AL5	.1Ω	150KΩ	0Ω	.1Ω	100Ω	Inf.	3.3KΩ		
V 9	6AG5	1 Meg.	120Ω	.1Ω	0Ω	♯12KΩ	♯66KΩ	120Ω		
V 10	7C5	0Ω	♯3KΩ	♯78KΩ	47KΩ	Inf.	370KΩ	47Ω	.1Ω	
V 11	7F7	.1Ω	1.2KΩ	♯47KΩ	1.1 Meg.	0Ω	0Ω	1 Meg.	0Ω	
V 12	6BA6	470KΩ	0Ω	0Ω	.1Ω	†2KΩ	†2KΩ	68Ω		
V 13	6AU6	68KΩ	0Ω	0Ω	.1Ω	†10KΩ	†10KΩ	0Ω		
V 14	6AL5	1 Meg.	1 Meg.	2Ω	.1Ω	70KΩ	Inf.	70KΩ		
V 15	6AU6	4.7 Meg.	0Ω	0Ω	.1Ω	♯47KΩ	♯560KΩ	0Ω		
V 16	6K6GT	Inf.	.1Ω	♯2.5KΩ	♯2KΩ	1 Meg.	♯2KΩ	0Ω	560Ω	
V 17	7N7	.1Ω	0Ω	♯15KΩ	500KΩ	4.7 Meg.	♯22KΩ	0Ω	0Ω	
V 18	7N7	.1Ω	1.2KΩ	♦10KΩ	2.1 Meg.	2.1 Meg.	♦700KΩ ♦480KΩ	0Ω	0Ω	
V 19	6K6GT	Inf.	0Ω	♯680Ω	♯680Ω	2.2 Meg.	.1Ω	.1Ω	6KΩ 1KΩ	
V 20	7N7	.1Ω	280KΩ	♯40KΩ	840KΩ	200KΩ	♯80KΩ	0Ω	0Ω	
V 21	6BG6G	Inf.	.1Ω	0Ω	330KΩ	330KΩ	600KΩ	0Ω	♯5KΩ	TOP CAP ♦100Ω
V 22	6W4GT	Inf.	Inf.	220KΩ	Inf.	♯90Ω	Inf.	0Ω	.1Ω	
V 23	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦260Ω
V 24	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦ Inf.
V 25	5U4G	Inf.	30KΩ	Inf.	205Ω	Inf.	200Ω	Inf.	30KΩ	
V 26	7Z4	.1Ω	Inf.	190Ω	Inf.	Inf.	180Ω	30KΩ	0Ω	
‡ V 27	12AU6	1 Meg.	140Ω	34Ω	40Ω	††180Ω	††15KΩ	220Ω		
‡ V 28	14F8	15KΩ	25Ω	††20KΩ	70Ω	1.5KΩ	††20KΩ	17Ω	10KΩ	
V 29	12AU7	††45KΩ	15KΩ	70Ω	110Ω	100Ω	††20KΩ	4.5 Meg.	1.5KΩ	108Ω
V 30	6BJ6	4.5 Meg.	120Ω	40Ω	44Ω	††4.3KΩ	††4.3KΩ	68Ω		
V31	6BJ6	12Ω	68Ω	42Ω	48Ω	††1000Ω	††13KΩ	0Ω		
V32A	19T8	Inf.	47KΩ	Inf.	0Ω	16Ω	370KΩ	0Ω	10 Meg.	††270KΩ
‡ V32B	19T8	Inf.	47KΩ	Inf.	0Ω	16Ω	370KΩ	0Ω	10 Meg.	††270KΩ
V33	5OC6G	0Ω	56Ω	††330Ω	††3.4KΩ	470KΩ	0Ω	45Ω	220Ω	
V34	12LP4	0Ω	1.5 Meg.	PIN 10 ♯5KΩ	PIN 11 100KΩ	PIN 12 .1Ω				

‡ Taken in FM position.
† Measured from pin 7 of V26.
♯ Measured from pin 8 of V25.
♦ Measured from pin 3 of V22.
†† Measured from output of M2.
Note 1. AVC switch in off position for these measurements.
Note 2. All measurements taken from B- on radio chassis are taken from power switch.

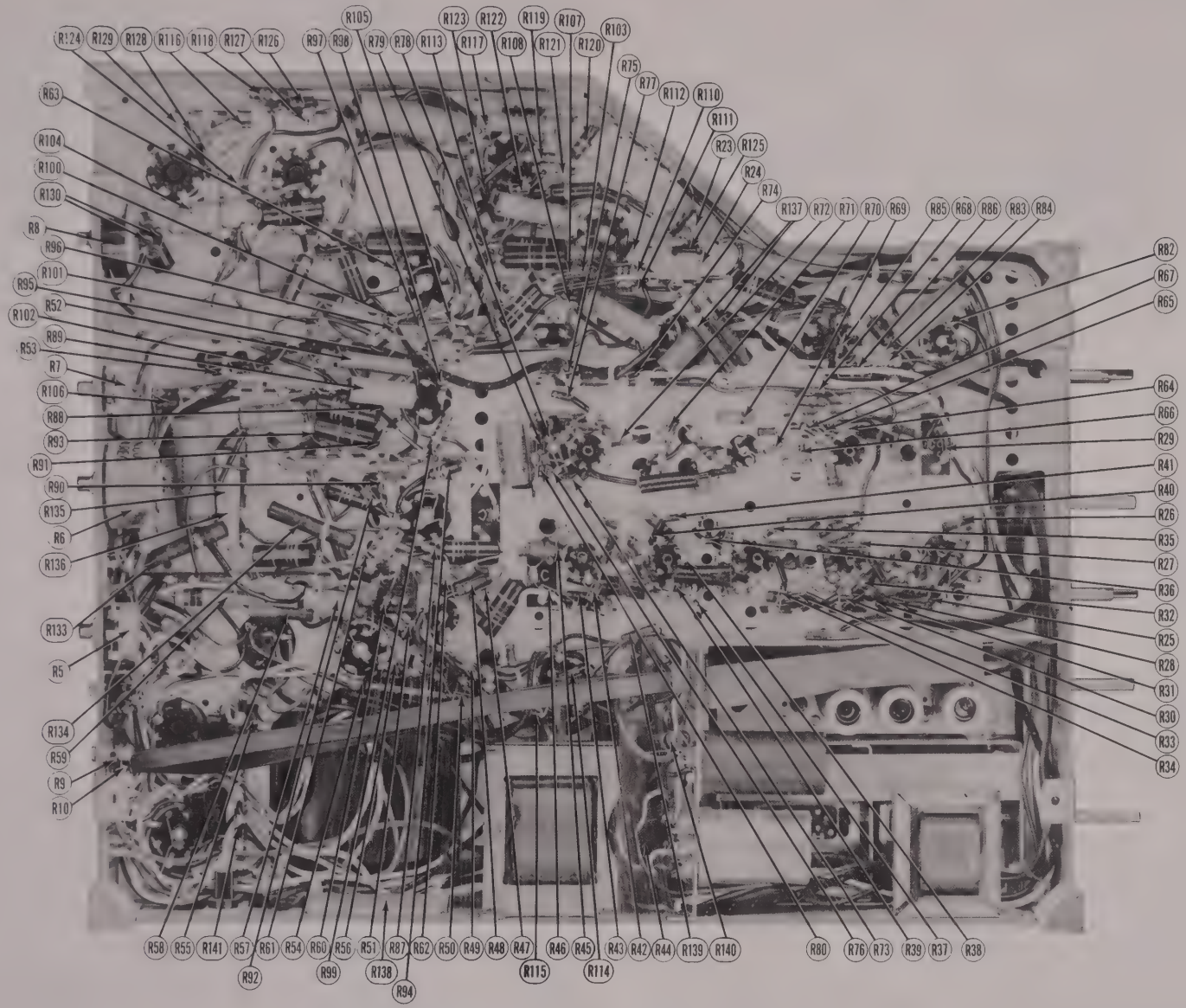
1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RF TUNER-BOTTOM VIEW



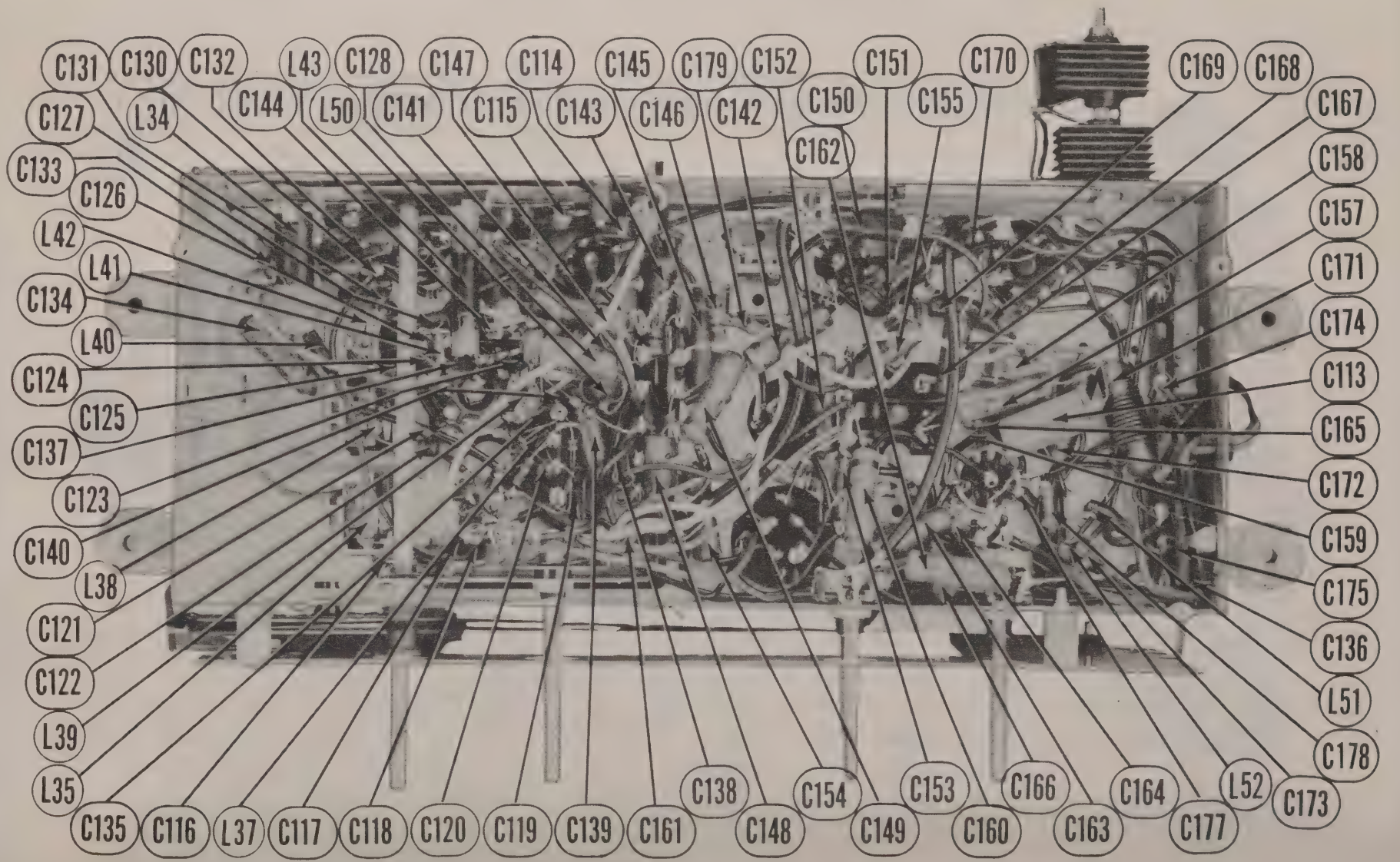
CABINET-REAR VIEW



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

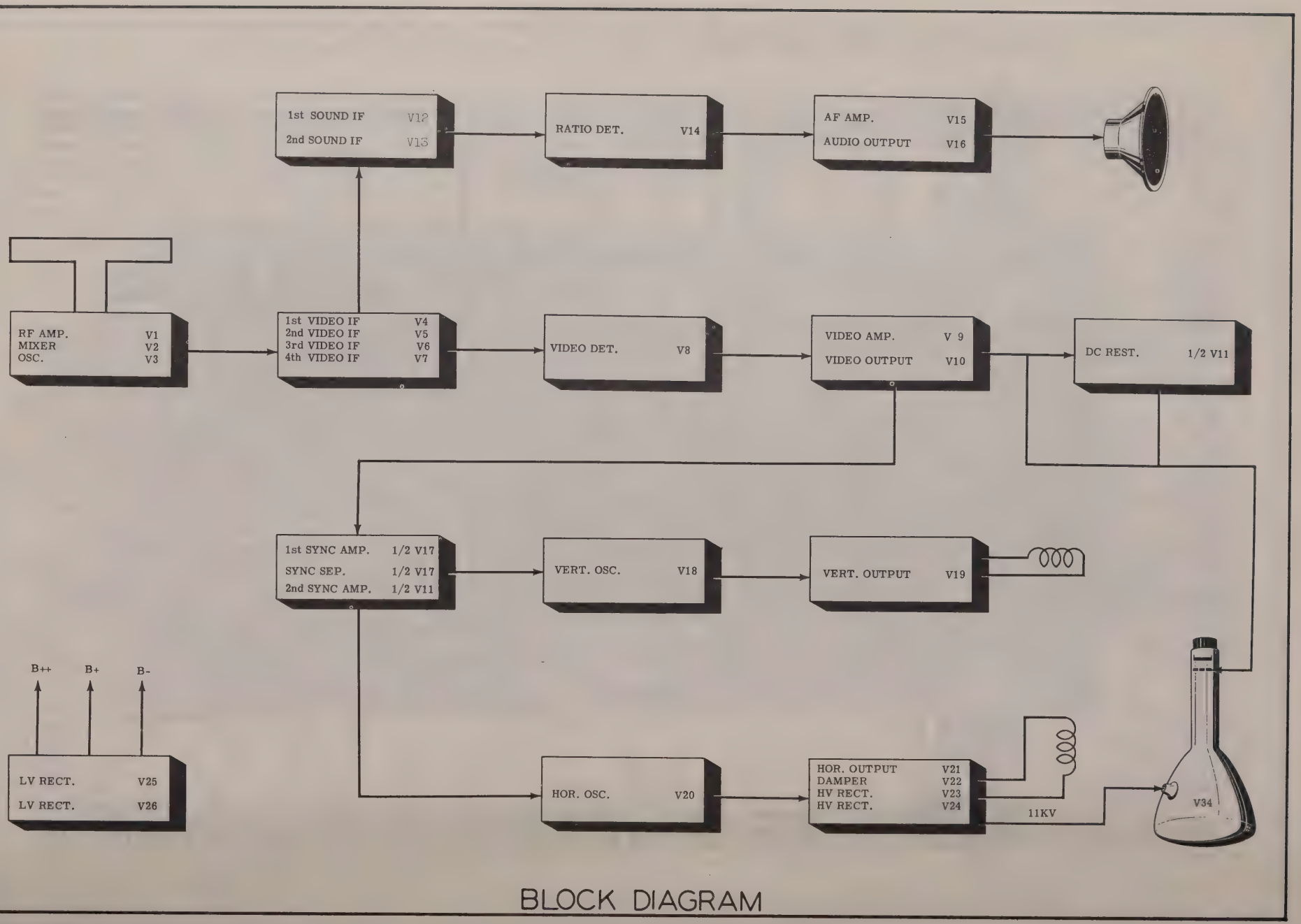
RADIO CHASSIS–TOP VIEW

PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)

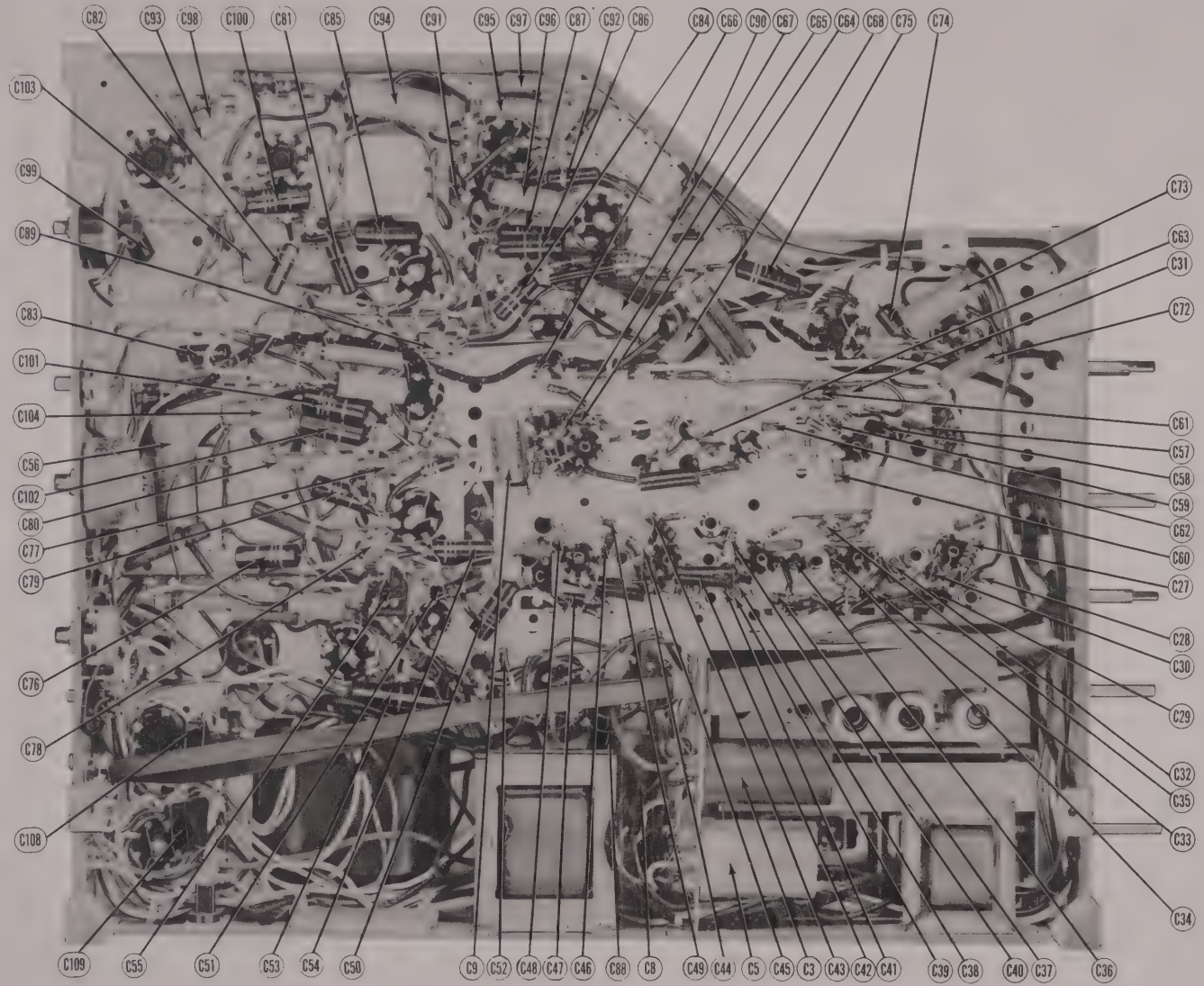


RADIO CHASSIS-BOTTOM VIEW-CAPACITOR IDENTIFICATION

RADIO CHASSIS-BOTTOM VIEW-RESISTOR IDENTIFICATION



BLOCK DIAGRAM



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TV PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		PHILCO PART No.	STANDARD REPLACEMENT		
V1	RF Amp.	6AG5	6AG5	7BD	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6J6	6J6	7BF	
V4	1st Video IF	6AG5	6AG5	7BD	
V5	2nd Video IF	6AG5	6AG5	7BD	
V6	3rd Video IF	6AG5	6AG5	7BD	
V7	4th Video IF	6AG5	6AG5	7BD	
V8	Video Det.	6AL5	6AL5	6BT	
V9	Video Amp.	6AG5	6AG5	7BD	
V10	Video Output	7C5	7C5	6AA	
V11	DC Restorer-2nd Sync. Amp.	7F7	7F7	8AC	
V12	1st Sound IF	6BA6	6BA6	7BK	
V13	2nd Sound IF	6AU6	6AU6	7BK	
V14	Ratio Det.	6AL5	6AL5	6BT	
V15	AF Amp.	6AU6	6AU6	7BK	
V16	Audio Output	6K6GT	6K6GT	7S	
V17	1st Sync. Amp.-Sync. Sep.	7N7	7N7	8AC	
V18	Vert. Osc.	7N7	7N7	8AC	
V19	Vert. Output	6K6GT	6K6GT	7S	
V20	Hor. Osc.	7N7	7N7	8AC	
V21	Hor. Output	6BG6G	6BG6G	5BT	
V22	Damper	6W4GT	6W4GT	4CG	
V23	HV Rectifier	1B3GT	1B3GT	3C	
V24	HV Rectifier	1B3GT	1B3GT	3C	
V25	LV Rectifier	5U4G	5U4G	5T	
V26	LV Rectifier	7Z4	7Z4	5AB	
V34	Picture Tube	12LP4	12LP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1	30	475	30-2568-19	AF6X	UP3050		TVL-7	Filter
C2A	40	475	30-2570-8	AF824X2A	UP9DJ826		TVL-38	◓ Filter
B	10	475						■ Filter
C	20	475						▲ Filter
C3	30	250	30-2568-19	AF6F	UP3025		TVL-63	Filter
C4A	10	450	30-2570-16	AF22J	UP5CJ879		TVL-52	▲ Filter
B	10	450		PRS50/50				■ Filter
C	40	50						Vert. Output Cath. Bypass
C5A	10	475	30-2570-13	AF2222X	UP7DJ825		TVL-39	◓ V. Amp. Screen Byp.
B	10	475						▲ Low Pass Filter
C	10	475						V. Output Screen Bypass
C6A	10	450	45-3006	AF22J	UP5CJ879		TVL-52	■ Decoupling
B	10	450		PRS50/50				▲ Vert. Osc. Plate Dec.
C	40	50						Output Cath. Bypass
C7A	10	475	30-2570-10	AF2222X	UP7DJ825		TVL-39	◓ Sync. Amp. Dec.
B	10	475						■ Decoupling
C	10	475						▲ Decoupling
D	10	475						Decoupling
C8	10	25	30-2417-1	PRS50/10	BR105		TVA-5	AGC Filter
C9	2	50	30-2417-7	E26E6	BBR2-50		TVA-12	Stabilizing Cap.
C10	220		62-122001001			GP2K-220		RF Coupling
C11	470		62-147001001			GP2K-470		AGC Filter
C12	470		62-147001001			GP2K-470		RF Decoupling
C13	10		62-010009001			GP1K-10		RF Decoupling
C14	470		62-147001001			GP2K-470		RF Filament Bypass
C15	220		62-122001001			GP2K-220		RF Coupling
C16	10		62-010009001			GP1K-10		Mixer Screen Bypass
C17	470		62-147001001			GP2K-470		Mixer Screen Bypass
C18	22		62-022009001			GP1K-22		Osc. Grid Cap.
C19	12		30-1224-5					Osc. Grid Filter
C20	220		62-122001001			GP2K-220		Osc. Cath. Bypass
C21	470		62-147001001			GP2K-470		Osc. Plate Dec.
C22	.001		45-3500-5			GP2L-001		RF Bypass *
C23	3.3		30-1221			NP0K-3.3		Freq. Comp.
C24	220		62-122001001			GP2K-220		Phase Shifter
C25	470		62-147001001			GP2K-470		AFC Filter
C26	470		62-147001001			GP2K-470		Osc. Filament Bypass
C27	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Mixer Plate Dec.
C28	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	IF Coupling
C29	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C30	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Dec.
C31	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	RF Bypass
C32	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	IF Coupling
C33	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C34	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Dec.
C35	10		62-010009001	1468-00001	5W5Q1	GP1K-10	MS-41	2nd V. IF Dec.
C36	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	IF Coupling
C37	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C38	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Dec.
C39	10		62-010009001	1468-00001	5W5Q1	GP1K-10	MS-41	3rd V. IF Dec.
C40	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	IF Coupling
C41	18		60-00185317					Fixed Trimmer ††
C42	18		60-00185317					Fixed Trimmer ††
C43	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Cath. Bypass
C44	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	4th V. IF Decoupling
C45	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	IF Coupling
C46	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C47	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	AGC Filter
C48	10		62-010009001	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C49	56		62-056409001					Fixed Trimmer ♦
C50	.047	400	62-0122	P488-047	GT4S5		TM-15	Video Coupling

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C51	.0033	600	61-0109	P688-0033	GT6D3	GP2M-0033	TM-23	1st V. Amp. Cath. Byp.
C52	56		62-056409001					Fixed Trimmer
C53	.22	400	45-3500-9	P488-22	GT4P25		TC-2	Video Coupling
C54	.047	400	45-3500-14	P488-047	GT4S5		TM-15	Video Coupling
C55	4000	500	45-3502	1467-004	1D5D4	GP2M-0047	1FM-24	Video Coupling
C56	.5	400	45-3500-4	484-5	GT4P5		TC-5	Pic. Tube Cath. Dec.
C57	56		62-056409001					Fixed Trimmer
C58	.01	100	30-1226-10	P488-01	GT2S1	GP2-335-01	TM-11	S. IF Coupling
C59	470		62-147001001	1468-0005	5W5T5	GP2K-470	1FM-35	1st S. IF Cath. Byp.
C60	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Dec.
C61	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Decoupling
C62	56		62-056409001	1468-00005	5W5Q5	GP1K-56	1FM-45	S. IF Coupling
C63	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd S. IF Dec.
C64	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Diode Load Cap.
C65	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Diode Load Cap.
C66	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C67	.1	200	61-0113	P288-1	GT2P1		TM-1	AFC Filter
C68	.1	200	61-0113	P288-1	GT2P1		TM-1	AFC Filter
C69	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Audio Coupling
C70	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	Tone Comp.
C71	.002	400	61-0062	P688-002	GT6D2	GP2M-002	TM-22	Tone Comp.
C72	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Audio Coupling
C73	.1	400	61-0113	P488-1	GT4P1		TM-1	AF Screen Bypass
C74	.01	600	61-0120	P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C75	.0068	1000	61-0105	P1088-0068	GT16D7		MB-27	Output Plate Bypass
C76	.047	400	61-0122	P488-047	GT4S5		TM-15	Sync. Coupling
C77	330	500	60-10335407	1468-00035	5W5T3	GP2K-330	1FM-335	Sync. Coupling
C78	22	500	60-00245307	1468-000025	5W5Q25	GP1K-22	MS-425	Sync. Sep. Grid Bypass
C79	.047	400	61-0122	P488-047	GT4S5		TM-15	Sync. Coupling
C80	220	500	62-122001001	1468-0002	5W5T2	GP2K-220	1FM-32	Voltage Divider
C81	.0022	600	61-0062	P688-0022	GT6D2	GP2M-0022	TM-22	Integrator Net.
C82	.0047	600	45-3502	P688-0047	GT6D5	GP2M-0047	TM-25	Integrator Net.
C83	.0047	600	45-3502	P688-0047	GT6D5	GP2M-0047	TM-25	Integrator Net.
C84	.0056	400	45-3500-7			GP2M-0056		Vert. Osc. Grid
C85	.1	200	30-4668-30	P288-1	GT2P1		TM-1	Cathode Bypass †
C86	.022	600		P688-022	GT6S2		TM-12	Vert. Discharge §
C87	.047	400		P488-047	GT4S5		TM-15	Vert. Discharge §
C88	.1	400	61-0113		GT4P1		TM-1	Vert. Sweep Coupling
C89	150	500	60-10155407	1468-00015	5W5T15	GP2K-150	1FM-315	Hor. Sync. Coupling
C90	180	500	30-1220-30			GP2K-180		Voltage Divider *
C91	270	500	60-10275407			GP2K-270		Hor. Osc. Grid Cap.
C92	.0022	600	61-0062	P688-0022	GT6D2	GP2M-0022	TM-22	Hor. Sync. Coupling
C93	5	500	60-90505007	1468-000005	5W5V5	NP0K-5	MS-55	Hor. Feedback
C94	.25	400	61-0125	P488-25	GT4P25		TC-2	AFC Filter
C95	.02	400	61-0108	P488-02	GT4S2		TM-12	AFC Filter
C96	.05	400	61-0122	P488-05	GT4S5		TM-15	Hor. AFC Plate Bypass
C97	1500	500	60-20155404	1467-0015	1W5D15	GP2L-0015	1FM-215	Hor. Discharge
C98	390	500	60-10305307	1468-0004	5W5T4	GP2K-390	1FM-34	Hor. Sweep Coupling
C99	.047	400	61-0122	P488-047	GT4S5		TM-15	Hor. Output Screen Byp.
C100	.047	400	61-0122	P488-047	GT4S5		TM-15	Damper Filter
C101	.047	400		P488-047	GT4S5		TM-15	Damper Filter } §
C102	.022	600		P688-022	GT6S2		TM-12	Damper Filter }
C103	.5	200	61-0122	P288-5	GT2P5		TC-5	Hor. Sweep Coupling
C104	.1	200	61-0113	P288-1	GT2P1		TM-1	Bias Filter
C105	500	20000	30-1229-2			410-500		HV Filter
C106	500	20000	30-1229-2			410-500		HV Filter
C107	500	20000	30-1229-2			410-500		Voltage Doubler Cap.
C108	.01	600	30-1226-1	P688-01	GT6S1		TM-11	Line Filter
C109	.01	600	30-1226-1	P688-01	GT6S1		TM-11	Line Filter
C110	150	500	60-10155407	1468-00015	5W5T15	GP2K-150	1FM-215	Vert. Sync. Plate Bypass ‡

* Not used in all models.
♣ Code 123T models use 39MMF in this application. MFGR'S Part No. 30-1224-63.
† Used only in code 123 models.
§ Code 121 models use .082MFD in this application.
‡ Used only in code 121 models.
†† Code 123T models use 51MMF in this application. MFGR'S Part No. 30-1224-2.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	1 Meg.	½	33-5563-3		33-5563-3	Vert. Hold Control (Dual Concentric)
B	50KΩ	½				Horiz. Hold Control
R2	2 Meg.	½	33-5564-1			Volume Control and Switch Tapped @ 1 Meg.
R3A	250KΩ	½	33-5563-14			Channel Adjuster and Switch * (Dual Concentric)
B	250Ω	2				Contrast Control *
R3	5000Ω	2	33-5546-11			Contrast Control #
R4	100KΩ	½	33-5539-43	Q11-128	M-49-S	Brightness Control
R5	5000Ω	½	33-5546-10	Q11-114	M-19-S	Vert. Linearity Control
R6	500Ω	25	33-5547-5		PW-25-500	Focus Control (Wire Wound)
R7	250KΩ	½	33-5539-42	Q11-130	M-55-S	Height Control
R8	10KΩ	2	33-5546-18	W-10K	58-10K	Deflection Control (Wire Wound) *

* Not used on code 121 models.
# Used only on code 121 models.

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED
R9	220Ω	½	66-1228340		Ant. Isolation
R10	220Ω	½	66-1228340		Ant. Isolation
R11	100KΩ 20%	½	66-4108340		RF Grid
R12	47Ω	½	66-0478340		RF Cathode
R13	2700Ω	½		BTS-2700	RF Plate
R14	1000Ω	½	66-2108340	BTS-1000	RF Decoupling
R15	100KΩ 20%	½	66-4108340		Mixer Grid
R16	56KΩ	½	66-3568340	BTS-56K	Mixer Screen

TV PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
R1	[illegible]	±	66-1228340		Osc. Cathode
R2	[illegible]	±	66-3224340	BTS-22K	Osc. Grid
R3	[illegible]	1	66-3224340	BTA-22K	Voltage Divider
R4	[illegible]	±	66-3224340	BTS-22K	AFC Network
R5	[illegible]	±	66-1568340		Osc. Control Grid
R6	[illegible]	±	66-4338340	BTS-330K	Voltage Divider Note 1
R7	[illegible]	±	66-3158340	BTS-15K	Voltage Divider Note 1
R8	[illegible]	±	66-4278340	BTS-270K	Voltage Divider Note 1
R9	[illegible]	±	66-2828340		1st Video IF Grid
R10	[illegible]	2	66-1128340	BW-½-120	1st Video IF Cathode (Wire Wound)
			66-1338340		1st Video IF Decoupling
R11	[illegible] 20%	±	66-2538340	BTS-3300	AGC Network
R12	[illegible]	±	66-2688340	BTS-3300	Decoupling
R13	[illegible] 20%	±	66-2338340	BTS-3300	ACC Network
			66-2568340		2nd Video IF Grid
R14	[illegible]	2	66-1128340	BW-½-120	2nd Video IF Cathode (Wire Wound)
R15	[illegible] 20%	±	66-2538340	BTS-3300	ACC Network
			66-2568340		3rd Video IF Grid
			66-0688340		3rd Video IF Cathode
			66-2828340		3rd Video IF Coil Shunt
R16	[illegible] 5%	±	66-3228340	BTS-22K-5%	IF Filter Network See Note 8
			66-3158340		4th Video IF Grid Coil Shunt
R17	[illegible]	±	66-1108340		4th Video IF Cathode
R18	[illegible]	±	66-2688340	BTS-6800	4th Video IF Plate
R19	[illegible]	±	66-2108340	BTS-1000	4th Video IF Decoupling
R20	[illegible]	±	66-3278340	BTS-27K	AGC Filter Network
R21	[illegible]	±	66-1128340	BTS-120K	AGC Rect. Load
R22	[illegible]	±	66-3108340	BTS-10K	AGC Network
R23	[illegible]	±	66-3478340	BTS-47K	Keying Coil Shunt
R24	[illegible] 5%	±	66-2338340	BTS-3300-5%	Video Det. Diode Load
R25	[illegible] Meg.	±	66-5108340	BTS-1 Meg.	Video Amp. Grid
R26	[illegible]	±	66-1128340	BW-½-120	Video Amp. Cathode (Wire Wound)
R27	[illegible]	±	66-3478340	BTS-47K	Trap Coil Shunt See Note 2
R28	[illegible] 5%	±	66-2188340	BTS-1800-5%	Video Amp. Plate
R29	[illegible]	±	66-3568340	BTS-56K	Video Amp. Screen
R30	[illegible]	±	66-3108340	BT-2-10K	Decoupling See Note 3
R31	[illegible] 20%	±	66-4108340	BTS-100K	Voltage Divider
R32	[illegible]	±	66-4338340	BTS-330K	Video Output Grid
R33	[illegible]	±	66-0478340	BW-½-47	Video Output Cathode (Wire Wound)
R34	[illegible]	±	66-3688340	BTS-68K	Video Output Screen
R35	[illegible]	5	66-1338340		Video Output Plate (Wire Wound)
R36	[illegible] 5%	1	66-1338340	BTA-330-5%	Video Output Plate (Wire Wound)
R37	[illegible]	1	66-2108340	BW-2-1000	Low Pass Filter
R38	[illegible]	±	66-3278340	BTS-27K	Peaking Coil Shunt
R39	[illegible]	±	66-3108340	BTS-10K	Phase Correction
R40	[illegible]	±	66-4478340	BTS-470K	Picture Tube Grid
R41	[illegible] 5%	±	66-5108340	BTS-1 Meg.	DC Rest. Diode Load
R42	[illegible]	±	66-4478340		1st Sound IF Grid
R43	[illegible] 20%	±	66-0688340		1st Sound IF Cathode
R44	[illegible]	±	66-3228340	BTS-22K	1st Sound IF Transformer Shunt
R45	[illegible]	±	66-2108340	BTS-1000	1st Sound IF Decoupling
R46	[illegible]	±	66-1338340		Decoupling
R47	[illegible] 20%	±	66-3688340	BTS-68K	2nd Sound IF Grid
R48	[illegible]	±	66-3108340	BTA-10K	2nd Sound IF Decoupling
R49	[illegible]	±	66-3228340	BTS-22K	Voltage Divider
R50	[illegible]	±	66-0478340	BW-½-47	Balancing
R51	[illegible]	±	66-0478340	BW-½-4.7	Ratio Det. Filament
R52	[illegible] 5%	±	66-4478340	BTS-470K	AFC Network
R53	[illegible] 5%	±	66-4478340	BTS-470K	AFC Network
R54	[illegible]	±	66-2688340	BTS-6800	Balancing
R55	[illegible]	±	66-5108340	BTS-10K	De-emphasis
R56	[illegible]	±	66-2688340	BTS-6800	Balancing
R57	[illegible]	±	66-3688340	BTS-68K	Ratio Det. Diode Load
R58	[illegible]	±	66-3688340	BTS-68K	Ratio Det. Diode Load
R59	[illegible]	±	66-5478340	BTS-47K	Tone Compensation
R60	4.7Meg.20%	±	66-5478340	BTS-4.7 Meg.	AF Grid
R61	[illegible]	±	66-4564340	BTS-560K	AF Screen
R62	[illegible]	±	66-3474340	BTA-47K	AF Plate
R63	1 Meg. 20%	±	66-5108340	BTS-1 Meg.	Output Grid
R64	[illegible]	±	66-1564340	BTA-560	Output Cathode
R65	470K 20%	±	66-4478340	BTS-470K	1st Sync. Amp. Grid
R66	[illegible]	±	66-3108340	BT-2-10K	1st Sync. Amp. Plate
R67	[illegible]	5	33-1335-18	AB-5000	1st Sync. Amp. Plate Decoupling (Wire Wound)
R68	[illegible]	±	66-3108340	BTS-10K	Sync. Sep. Grid
R69	4.7 Meg.	±	66-5478340	BTS-4.7 Meg.	Sync. Sep. Grid
R70	[illegible]	±	66-2338340	BTS-3300	Voltage Divider
R71	[illegible]	±	66-2688340	BTS-6800	Voltage Divider
R72	[illegible]	±	66-3564340	BTA-56K	Sync. Sep. Plate
R73	1 Meg.	±	66-5108340	BTS-1 Meg.	Voltage Divider
R74	[illegible]	±	66-2478340	BTS-4700	2nd Sync. Amp. Grid
R75	1 Meg.	±	66-3108340	BTS-10K	2nd Sync. Amp. Plate
R76	[illegible]	±	66-3398340	BTS-3900	2nd Sync. Amp. Plate
R77	[illegible]	±	66-3344340	BTA-33K	2nd Sync. Amp. Plate Decoupling
R78	[illegible]	±	66-3228340	BTS-22K	Integrator
R79	[illegible]	±	66-2828340	BTS-8200	Integrator
R80	[illegible]	±	66-2828340	BTS-8200	Integrator
R81	[illegible]	±	66-3688340	BTS-68K	Vert. Osc. Grid
R82	10KΩ	±	66-3108340	BTS-10K	Vert. Osc. Plate Decoupling See Note 4
R83	12000Ω	±	66-2128340	BTS-1200	Vert. Osc. Cathode See Note 5
R84	[illegible]	±	66-3688340	BTA-68K	Voltage Divider
R85	10KΩ	±	66-3108340	BTS-10K	Isolation
R86	1 Meg.	±	66-5108340	BTS-1 Meg.	Vert. Osc. Grid
R87	100KΩ 20%	±	66-4108340	BTS-100K	Voltage Divider See Note 5
R88	470KΩ	±	66-4474340	BTA-470K	Vert. Osc. Plate
R89	1KΩ	±	66-3108340	BTS-10K	Vert. Osc. Plate Decoupling
R90	[illegible]	±	66-1478340	BTS-470	Isolation See Note 5
R91	47KΩ	±	66-2478340	BTS-4700	Vert. Peaking
R92	2.2Meg.20%	±	66-5228340	BTS-2.2 Meg.	Vert. Output Grid
R93	[illegible]	±	66-2104340	BTA-1000	Vert. Output Cathode
R94	[illegible]	±	66-4228340	BTS-2200	Voltage Divider
R95	[illegible] 5%	±	66-3108340	BTS-10K-5%	Horiz. Osc. Transformer Shunt
R96	[illegible] 5%	1	66-3688340	BTA-68K-5%	Horiz. Osc. Plate Decoupling
R97	[illegible] 5%	1	66-4104340	BTA-100K-5%	Horiz. Osc. Grid
R98	100KΩ 5%	1	66-4104340	BTA-100K-5%	Horiz. Osc. Cathode

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA IRC PART No.	IDENTIFICATION CODES
R101	[illegible]	±	66-4188340	BTS-180K	Horiz. Osc. Cathode
R102	[illegible]	±	66-4568340	BTS-560K	Horiz. Osc. Grid
R103	3.3 Meg.	1	66-5334340	BTA-3.3 Meg.	Voltage Divider
R104	560KΩ 5%	±	66-4568340	BTS-560K-5%	Feedback
R105	[illegible]	1	33-1343-2		Voltage Divider Temp. Comp.
R106	[illegible]	±	66-3824340	BTA-82K	Voltage Divider
R107	[illegible]	±	66-3108340	BTS-10K	Decoupling
R108	[illegible] 10%	±	66-1108340		Parasitic Supp.
R109	[illegible]	±	66-4338340	BTS-330K	Horiz. Output Grid
R110	[illegible]	2		BT-2-3900	Horiz. Output Screen See Note 2
R111	[illegible]	2	66-1105340	BW-2-100	Horiz. Output Cathode See Note 7
R112	[illegible]	±	33-1338		HV Filter
R113	[illegible]	2	66-0125340	BW-2-12	Bias Network (Wire Wound)
R114	12Ω	2	66-0125340	BW-2-12	Bias Network (Wire Wound)
R115	47KΩ 20%	±	66-3478340	BTS-47K	Bias Network
R116	1MΩ	10	33-1336-21	AB-[illegible]	Filter (Wire Wound)
R117	270Ω	2	66-1274340	BW-2-270	Filter (Wire Wound) See Note 6
R118	19000Ω	10	33-3435-15	AB-2000	Filter (Wire Wound)
R119	1 Meg. 10%	1		BTA-1 Meg.	Bleeder
R120	[illegible]	2	66-0565340		Surge Limiter (Wire Wound)
R121	[illegible]	±	66-0338340	BW-½-33	Pilot Lamp Shunt (Wire Wound)
R122	10KΩ	±	66-3108340		IF Filter Network See Note 9
R123	82000Ω	2	66-2828340	BTS-8200	Peaking

Note 1. Used only in code 121 models.
Note 2. Code 121 models use 10KΩ resistor in this application.
Note 3. Code 121 models use 10KΩ 1 Watt resistor in this application.
Note 4. Code 121 models use 100KΩ resistor in this application.
Note 5. Not used in code 121 models.
Note 6. Some models use 2 resistors in parallel, to obtain required resistance and wattage.
Note 7. Used only in model 49-1450, code 123.
Note 8. Code 123T uses 5100Ω resistor in this application.
Note 9. Used only in code 123T.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.
T1	117VAC @ 2.04A	720 V.C.T. @ .1A & 6.3VAC @ 10A	6.3VAC @ 3A	6.3VAC @ 10A	32-[illegible]			TF-[illegible]

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	NOTES
T2	3Ω	0Ω	32-4367				Hor.Block Osc.Trans.
T3	16Ω	35Ω	32-8304-3			TB0-1	Vert.Block Osc.Trans.
T4	2Ω	85Ω, 1 Tap @ 5.5Ω Tap 40Ω @ 1.9Ω SEC. 2,3 0Ω	32-8398				Hor. Output Trans.
T5	650Ω	6Ω	32-8206-1	A-8115			Vert. Output Trans.
T6A	3.5Ω		32-9604				Hor. Deflection Coil
B	30Ω						Vert. Deflection Coil
T7	100Ω		76-2622-3				Focus Coil

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
T8	4600Ω	3.7Ω	510Ω	.42	32-8356	A-8077	A-2930	RC-9	

SPEAKER

ITEM No.	RATINGS FIELD RES.	RATINGS V. C. IMP.	REPLACEMENT DATA PHILCO PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1	PM	3.2Ω	36-1611-2	ST-120 ① MOD.P10-8	10A4A	① Replace output transformer to match 6-8Ω voice coil.
	CONE DIA.	V. C. DIA.				
SP2	9 3/8"	1"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	INSTALLATION NOTES
L1	.210A	85Ω	5.5Henries	32-8366	C-1946 ①	C-2196 ①	R-7200 ①②	① Drill new mounting holes.
L2	.076A	153Ω	6 Henries	32-8355-1	C-2303 ②	C-2974 ②	R-[illegible] ②②	② Drill one new mounting hole.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L3	Ant. & RF Assembly	0Ω		32-4115		Add channel number as suffix to part number for channel desired.
L4	Mixer & Osc. Assembly	[illegible]		32-4232		Add channel number as suffix to part number for channel desired.
L5	RF Choke	.1Ω		32-[illegible]-2		
L6	Fil. Choke	.[illegible]		32-4112-11		
L7	Fil. Choke	.6Ω		32-4112-4		
L8	Parasitic Supp.	.4Ω				
L9	1st Video IF	.1Ω		32-4359-4		
L10	2nd Video IF	.1Ω		32-4359		
L11	3rd Video IF	.1Ω		32-4359		
L12	4th Video IF	.1Ω		32-4234-3		
L13	Adjacent-Channel Trap	.1Ω		32-4234-4		
L14	Str. Video IF	.1Ω		32-4233-2		
L15	Cor. Video IF	.1Ω		32-4234-1		
L16	RF Choke	.1Ω		32-4112-11		
L17	RF Choke	.1Ω		32-4112-11		
L18	Fil. Choke	.1Ω		32-4112-11		
L19	Fil. Choke	.1Ω		32-4112-11		
L20	Fil. Choke	.1Ω		32-4112-11		
L21	Sound Trap	6Ω		32-4302		
L22	Peaking	4.6Ω		32-4303		
L23	4.5MC Trap	1Ω		32-4155		
L24	Peaking	2Ω		32-4143-1		
L25	Peaking	3Ω		32-4143-2		
L26	1st Sound IF	0Ω		32-4303		
L27	2nd Sound IF	.4Ω	.8Ω	32-4236		
L28	Ratio Det. Trans.	.1Ω	0Ω	32-4317		
L29	Fil. Choke	.1Ω		32-4112-11		
L30	Fil. Choke	.1Ω		32-4112-11		
L31	Hor. Size	.1Ω		45-9527		
L32	Hor. Linearity	10Ω		32-4211		
L34	Adjacent-Sound Trap			32-4302		Used in code 123T only.

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA PHILCO PART No.	REPLACEMENT DATA	NOTES
M3	Bayonet	6-8V	.15A	Brown	34-2068		Type #47

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M1	RF Tuner	76-2100-2	
M9	Fuse	41-5068-10	Type AGX 3/8 Amp.
M12	Ion Trap	76-2912	Permanent Magnet Type
M13	AVC Switch	42-1963	On-Off
M14	External-Internal SW.		
	Cabinet	10716	Model 49-1450M
	Cabinet	10716A	Model 49-1450L
	Cabinet	10733-7	Model 49-1475
	Cabinet	10736-1	Model 49-1480
	TV Back	54-7712	Model 49-1450
	TV Back	54-7712-1	Model 49-1475
	TV Back	76-4470	Model 49-1480 (Includes Cup Assy.)
	Radio Back	54-7748	Model 49-1475
	Radio Back	76-4481	Model 49-1480
	TV Back Cup	56-5171-3FJ31	Model 49-1475
	TV Back Cup	56-5171-5FJ31	Model 49-1450
	Safety Glass	54-7656-1	Model 49-1450
	Safety Glass	54-7659	Model 49-1475
	Safety Glass	54-7739-1	Model 49-1480
	Knob	54-4276	On-Off, Volume, Brightness } Mahogany
	knob	56-4925-1	Hor. Hold, Contrast } Mahogany
	Knob	54-4247	Vert. Hold, Fine Tuning } Mahogany
	Knob	56-4928-3	Channel Selector
	Knob	54-4248	On-Off Volume, Brightness } Blonde
	Knob	56-4925-5FCP	Hor. Hold, Contrast } Blonde
	Knob	54-4247-1	Vert. Hold, Fine Tuning } Blonde
	Knob	56-4928-4FCP	Channel Selector

PHILCO MODELS 49-1450, 49-1475, 49-1480 (Codes 121A or B, 123A or B, 123T A or B)

RADIO PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	NOTES
		PHILCO PART No.	STANDARD REPLACEMENT		
V27	FM RF Amp.	12AU6	12AU6	7BK	
V28	FM Converter	14F8	14F8	8BW	
V29	AM Converter	12AU7	12AU7	9A	
V30	1st IF Amp.	6BJ6	6BJ6	7CM	
V31	2nd IF Amp.	6BJ6	6BJ6	7CM	
V32	Ratio Det.-Det.-AVC-AF Amp.	19T8	19T8	9E	
V33	Power Output	50C6G	50C6G	7AC	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C111	40	200	30-2568-28	AFN8E	UP4025		EL-42	Voltage Doubler Cap.
C112A	40	300	30-2568-24	AF8842G	UP442130		D13307	◓ Filter
B	40	300						■ Filter
C	20	300						▲ Filter
D	10	300						Filter
C113	2	50	30-2417-7	E26E6	BBR2-50		TVA-12	Stabilizing Cap.
C114	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM Ant. Coupling
C115	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM Ant. Coupling
C116	51		30-1224-2	1468-00005	5W5Q5	GP1K-50	1FM-45	RF Coupling
C117	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM RF Cath. Bypass
C118	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM RF Screen Bypass
C119	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C120	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM RF Fil. Bypass
C121	51		30-1224-2	1468-00005	5W5Q5	GP1K-50	1FM-45	RF Coupling
C122	220		62-122001001	1468-0002	5W5T2	GP2K-220	1FM-32	RF Coupling
C123	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM Conv. Cath. Bypass
C124	51		30-1224-2	1468-00005	5W5Q5	GP1K-50	1FM-45	FM Osc. Grid
C125	220		62-122001001	1468-0002	5W5T2	GP2K-220	1FM-32	Osc. Feedback
C126	220		62-122001001	1468-0002	5W5T2	GP2K-220	1FM-32	Osc. Feedback
C127	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Osc. Plate Decoupling
C128	.03	400	61-0119	P488-03	GT4S3		TM-13	RF Bypass
C129	10		62-010009001	1469-00001	5R5Q1	NP0K-10	MS-41	Fixed Trimmer
C130	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Coupling
C131	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	AM Conv. Cath. Bypass
C132	220		62-122001001	1468-0002	5W5T2	GP2K-220	1FM-32	AM Osc. Grid
C133	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	Osc. Feedback
C134	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Tuning Cap. Isolation
C135	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM Conv. Fil. Bypass
C136	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	FM Conv. Fil. Bypass
C137	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	AM Conv. Fil. Bypass
C138	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	Decoupling
C139	.01	600	61-0120	P688-01	GT6S1	GP2-335-01	TM-11	FM Conv. Plate Dec.
C140	1500		62-215001011	1467-0015	1W5D15	GP2L-0015	1FM-215	FM Conv. Plate Dec. *
C141	.01	600	61-0120	P688-01	GT6S1	GP2-335-01	TM-11	AM Conv. Plate Dec.
C142	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Filament Bypass
C143	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Filament Bypass
C144	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	AVC Filter
C145	.05	400	61-0122	P488-05	GT4S5		TM-15	RF Bypass
C146	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C147	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	AVC Filter
C148	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	AVC Filter
C149	.004	600	61-0179	P688-004	GT6D4	GP2M-0047	TM-24	1st IF Decoupling
C150	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	2nd IF Cath. Bypass
C151	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	2nd IF Screen Bypass
C152	.01	600	61-0120	P688-01	GT6S1	GP2-335-01	TM-11	2nd IF Decoupling
C153	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	2nd IF Decoupling
C154	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	RF Bypass
C155	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	RF Bypass
C156	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass *
C157	.01	400	61-0120	P488-01	GT4S1	GP2-335-01	TM-11	Diode Load Cap.
C158	2700	500	60-20275404	1467-0025	1W5D25	GP2M-0027	1FM-225	De-emphasis
C159	2.2		30-1221-4					Fixed Trimmer
C160	.02	400	61-0108	P488-02	GT4S2		TM-12	Audio Coupling
C161	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass*
C162	.006	400	45-3500-7	P488-006	GT6D6	GP2M-0056	TM-26	Tone Comp.
C163	.006	400	45-3500-7	P488-006	GT6D6	GP2M-0056	TM-26	Audio Coupling
C164	51		30-1224-2	1468-00005	5W5Q5	GP1K-50	1FM-45	AF Grid Bypass *
C165	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	AF Plate Bypass
C166	.006	400	45-3500-7	P488-006	GT6D6	GP2M-0056	TM-26	Tone Comp.
C167	.006	400	45-3500-7	P488-006	GT6D6	GP2M-0056	TM-26	Audio Coupling
C168	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	Output Grid Bypass
C169	.006	400	45-3500-7	P488-006	GT6D6	GP2M-0056	TM-26	Output Plate Bypass
C170	220		62-110009001	1468-00025	5W5T25	GP2K-220	1FM-325	Output Cath. Bypass
C171	.05	400	61-0170	P488-05	GT4S5		TM-15	Line Isolation ♦
C172	.03	400	45-35001-1				72P51	Line Isolation
C173	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C174	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C175	.04	400	45-3500-2	P488-04	GT6S4		TM-14	Line Filter
C176	.1	400		P488-1	GT4P1		TM-1	External Isolation
C177	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	Filament Bypass *
C178	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass *
C179	100		62-110009001	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass *
C180	78		30-1244-61					Fixed Trimmer §§
C181	78		30-1244-61					Fixed Trimmer §§

* Not used in all models.
♦ When replacing item C171, rewind 10 turns of hook-up wire on replacement and connect in circuit as per original.
§§ Used only in code 123T models.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	
R142	4 Meg.	½	33-5538-34			Tone control and switch
R143	2 Meg.	½	33-5535-17	Q18-139X	T-116	Volume control, tapped @ 1 Meg.

RADIO PARTS LIST AND DESCRIPTIONS (CONT.)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	PHILCO PART No.	IRC PART No.	
R144	1 Meg.	½	66-5108340	BTS-1 Meg.	FM RF Grid
R145	100Ω	½	66-1108340		FM RF Cathode
R146	15KΩ	½	66-3158340	BTS-15K	FM RF Screen
R147	68Ω	½	66-0688340	BW-½-68	Bias Network
R148	10KΩ	½	66-3108340	BTS-10K	FM Conv. Grid
R149	1500Ω	½	66-2158340	BTS-1500	FM Conv. Cathode
R150	10KΩ	½	66-3108340	BTS-10K	FM Conv. Plate Decoupling
R151	15KΩ	½	66-3158340	BTS-15K	FM Osc. Grid
R152	10KΩ	½	66-3108340	BTS-10K	FM Osc. Plate Decoupling
R153	1 Meg.	½	66-5108340	BTS-1 Meg.	AM Conv. Grid
R154	1500Ω	½	66-2158340	BTS-1500	AM Conv. Cathode
R155	10KΩ	½	66-3108340	BTS-10K	AM Conv. Plate Decoupling
R156	15KΩ	½	66-3158340	BTS-15K	AM Osc. Grid
R157	33KΩ	½	66-3338340	BTS-33K	AM Osc. Plate
R158	1 Meg.	½	66-5108340	BTS-1 Meg.	AVC Network
R159	47Ω	½	66-0478340		1st IF Cathode
R160	1000Ω	½	66-2108340	BTS-1000	1st IF Decoupling
R161	3.3 Meg.	½	66-5338340	BTS-3.3 Meg.	AVC Network
R162	68Ω	½	66-0688340	BW-½-68	Bias Network
R163	68Ω	½	66-0688340		2nd IF Cathode
R164	10KΩ	½	66-3108340	BTS-10K	2nd IF Screen
R165	1000Ω	½	66-2108340	BTS-1000	2nd IF Decoupling
R166	330KΩ	½	66-4338340	BTS-330K	Diode Load
R167	47KΩ	½	66-3478340	BTS-47K	Diode Filter
R168	47KΩ	½	66-3478340	BTS-47K	De-emphasis
R169	100KΩ	½	66-4108340	BTS-100K	De-emphasis
R170	47KΩ	½	66-3478340	BTS-47K	Ratio Det. Diode Load
R171	47KΩ	½	66-3478340	BTS-47K	Tone Compensation
R172	10 Meg.	½	66-6108340	BTS-10 Meg.	AF Grid
R173	270KΩ	½	66-4278340	BTS-270K	AF Plate
R174	470KΩ	½	66-4478340	BTS-470K	Output Grid
R175	220Ω	2	66-1228340	BW-2-220	Output Cathode
R176	10KΩ	1	66-3104340	BTA-10K	Filter
R177A	3200Ω	10	33-3435-23	AB-3000	Filter (Wire Wound)
B	180Ω	10		AB-200	Filter (Wire Wound)
R178	50Ω	10	33-1335-84		Surge Limiter (Wire Wound)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T9	2700Ω	3.7Ω	188Ω	.4Ω	32-8367	A-3849	A-2902	RO-305	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	PHILCO PART No.	MEISSNER PART No.	
L33	AM Loop Ant.	0Ω		32-4273-1		
L34	AM Ant. Loading	1Ω		32-4217-1		
L35	FM Ant.	0Ω		32-4158-1		
L36	FM RF Chk.	.5Ω		32-4061-2		
L37	FM RF Plate	.5Ω		32-4061-2		
L38	FM RF Coil	0Ω		32-4159-1		
L39	FM RF Chk.	.5Ω		32-4061-2		
L40	RF Choke	.5Ω		32-4061-2		
L41	FM Osc. Plate	.5Ω		32-4061-2		
L42	FM Osc.	0Ω		32-4018-5		
L43	AM Osc.	11Ω		32-4221-1	14-1060	
L44	FM 1st IF	1Ω	1Ω	32-4372A		Tertiary winding 9Ω
L45	AM 1st IF	18Ω	19Ω	32-4258A		
L46	FM 2nd IF	1Ω	1Ω	32-4377-1A		
L47	AM 2nd IF	9Ω	10Ω	32-4160-3A		
L48	Ratio Det. Trans.	1Ω	.1Ω	32-4261-1		
L49	AM 3rd IF	15Ω	15Ω	32-4240-2A		
L50	RF Choke	.9Ω				
L51	IF Bypass	.4Ω		32-4061-2		
L52	Fil. Choke	1.5Ω		32-4143-4		
L53	RF Choke	.1Ω		32-4112-11		

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA			NOTES
	CURRENT	PHILCO PART No.	SYLVANIA PART No.		
M1	.110A	34-8003-2	ND-5		
M2	.110A	34-8003-2	ND-5		

DIAL LIGHTS

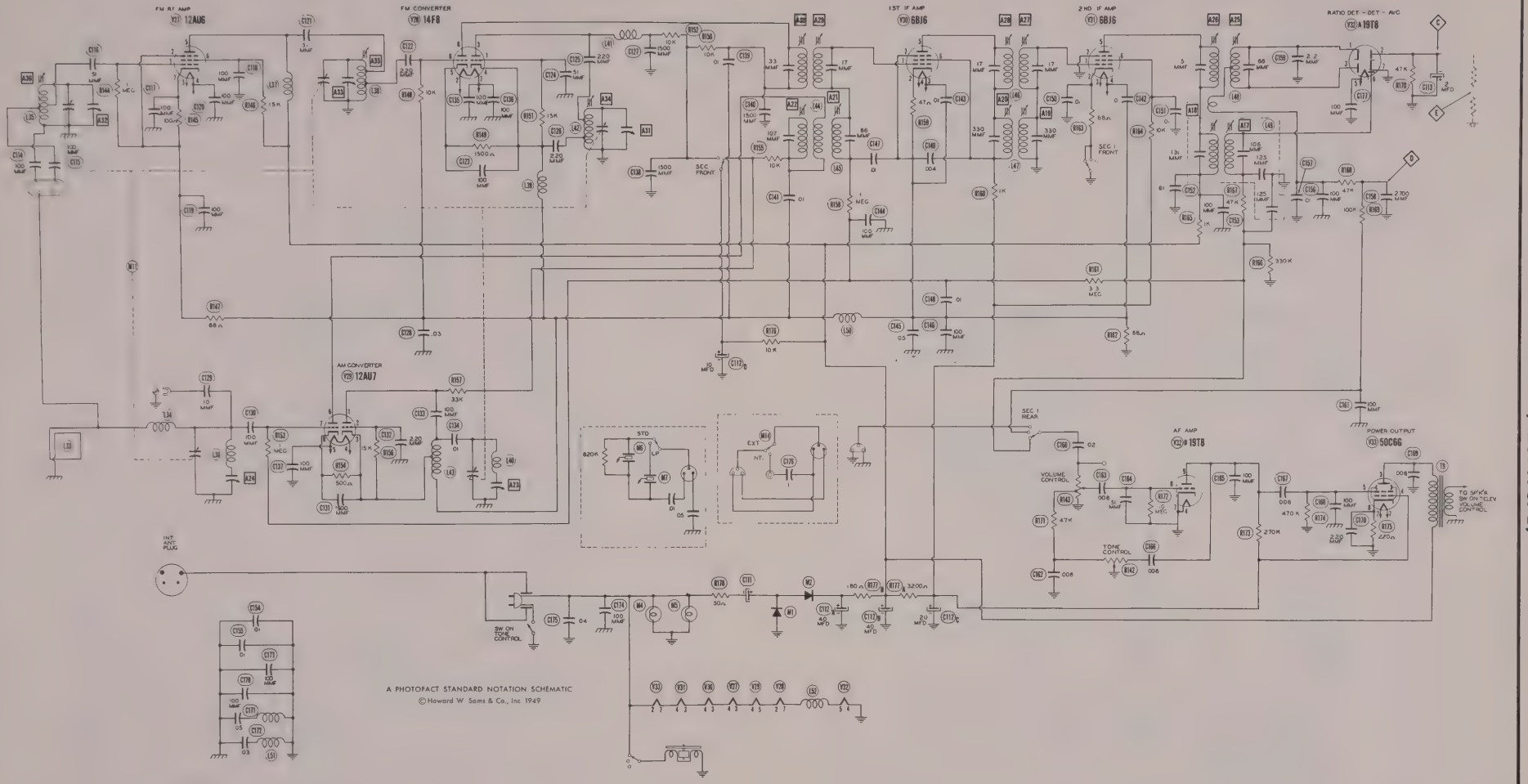
ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					PHILCO PART No.		
M4	Screw	120			34-2605		120V 7W
M5	Screw	120			34-2605		120V 7W

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA		REMARKS
	PHILCO PART No.	ASTATIC PART No.	
M6		LT-2M	STD.
M7		U-J	Long Play.

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M10	Band Switch	42-1874	
M11	Tuning Cap.	37-2724-7	(23-522MMF) (10-274MMF)


FM RF AMP
Y27 12AU6
FM CONVERTER
Y28 14F8
1ST IF AMP
Y30 6BJ6
2ND IF AMP
Y31 6BJ6
RATIO DET - DET - AVC
Y32 A 19T8
AM CONVERTER
Y29 12AU7
AF AMP
Y32 B 19T8
POWER OUTPUT
Y33 50C6G
STD
LP
EXT
INT.
SEC FRONT
SEC I REAR
VOLUME CONTROL
TONE CONTROL
INT. ANT. PLUG
SW ON TONE CONTROL
TO SPK'R SW ON TELEV VOLUME CONTROL
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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HORIZONTAL OSC. FREQUENCY ADJUSTMENT

If the picture cannot be properly synchronized horizontally with the horizontal hold control near mid-position, align the horizontal oscillator as follows:

1. Pre-set the adjustments as follows. Turn the horizontal frequency trimmer (B1) 1 1/2 turns counter-clockwise from maximum clockwise.
   Turn the horizontal lock in trimmer (B2) 1/2 turn counter-clockwise from maximum clockwise.
   Turn the horizontal hold control to approximately the center of its range.
2. Turn the set on and tune in a TV station.
3. Adjust the horizontal frequency slug (B3) until the picture synchronizes horizontally.
4. Turn the AVC switch off and adjust the contrast control to its normal setting.
5. Turn the horizontal hold control fully clockwise.
6. Adjust B3 until 8 to 10 stationary bars, sloping downward from the left side of the picture, are observed. If this cannot be done, adjust B1 an additional turn counter-clockwise and repeat step 6.
7. Turn the horizontal hold control counter-clockwise until the picture falls out of sync. It may be that the picture will not fall out of sync, even with the hold control at maximum counter-clockwise. If it doesn't, momentarily remove the signal by turning the contrast to minimum and back to normal. The picture should be out of sync.
8. Slowly turn the hold control clockwise and note the number of bars sloping upward to the left. Just before the picture falls into sync, there should be between 3 1/2 and 4 1/2 bars. If these are more than 4 1/2 bars, adjust B1 1/4 turn clockwise and repeat steps 5, 6, 7, and 8. If less than 3 1/2 bars appear, adjust B1 1/4 turn counterclockwise and repeat steps 5 thru 8.

HORIZONTAL LINEARITY ADJUSTMENTS

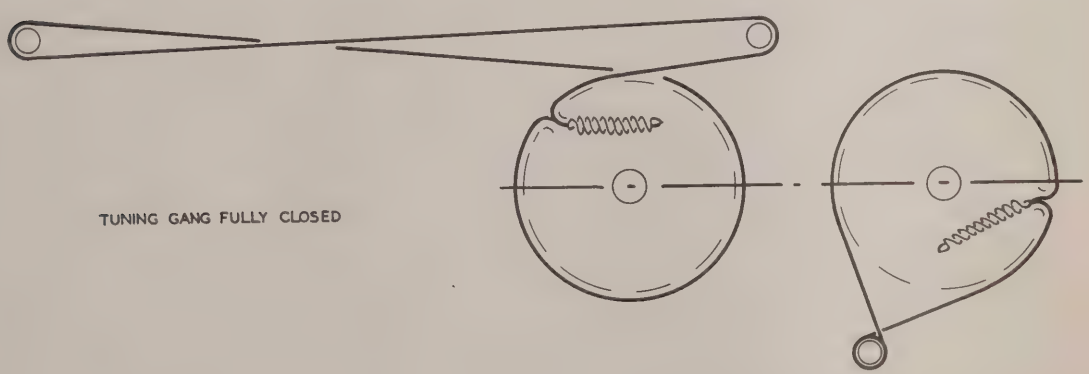
The deflection control is pre-set at the factory and should not normally require adjustment, In the event of a change of tube, or component part in the horizontal sweep circuit, it may be necessary to adjust the deflection control to obtain sufficient width.

For best results, the horizontal linearity adjustments should be made while receiving a test pattern from a TV station.
Adjust the horizontal width slug B4 until the picture properly fills the mask horizontally.
Adjust the horizontal linearity slug B5 until the picture is symmetrical from left to right.
Adjustments B4 and B5 are interacting and may require alternate adjustment for best overall results.

DISASSEMBLY INSTRUCTIONS

1. Remove 5 push-on type control knobs from TV chassis and 4 push-on type control knobs from receiver chassis.
2. Remove phillips head screw holding chain on rear cover of TV section.
3. Remove 11 phillips head screws holding cover on rear of TV. Remove cover.
4. Remove 7 phillips head screws holding rear cover of radio-phono section. Remove cover.
5. Remove 2 screws holding cover over rear of radio. Remove cover.
6. Remove speaker plug from rear of TV chassis.
7. Remove picture tube base socket.
8. Remove TV antenna plug from radio chassis.
9. Remove 2 leads from terminals on rear of radio.
10. Remove picture tube yoke socket from TV chassis.
11. Remove picture tube HV cap.
12. Remove four 5/16" hex nuts holding TV chassis. Remove chassis.
13. Remove 3 phillips head screws holding rear picture tube braces.
14. Remove three 7/16" hex nuts holding front clamp of picture tube. Remove tube.
15. Release lamp housing from clip under front of cabinet. Remove 2 panel lamps.
16. Remove four 3/8" hex nuts holding speaker. Remove speaker and one lamp.
17. Remove plug from center rear of receiver chassis.
18. Remove plug from switch assembly under receiver mounting board.
19. Remove 2 phillips head screws holding switch assembly. Remove assembly.
20. Disconnect phono motor wires at splices.
21. Remove antenna leads from terminals on rear of receiver chassis.
22. Remove four 3/8" hex head bolts holding receiver chassis. Remove chassis.

DIAL CORD STRINGING



TUNING GANG FULLY CLOSED

REMLER
MODEL 6000

REMLER
MODEL 6000

TRADE NAME	Remler, Model 6000
MANUFACTURER	Remler Co., Ltd., 2101 Bryand St., San Francisco, California
TYPE SET	AC-DC Operated Superhetrodyne Receiver With Loop Antenna
TUBES (Six)	Types 12SK7 RF Amp., 12SA7 Converter, 12SK7 IF Amp., 12SQ7 Det.-AVC-AF, 35L6GT Power Output, 35Z5GT Rectifier.
POWER SUPPLY	110-120 Volts AC-DC RATING .24 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535 - 1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set dial pointer, turn the tuning gang fully closed and set the right hand edge of the pointer 1 3/8 inches to the right of the extreme left hand edge of the dial backplate.

Use an isolation transformer, if available. If not, connect a .1MFD capacitor in series with the low side of the signal generator and B-.

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01 Mfd.	High side to stator of rear section of tuning gang. Low side to B-.	450KC (400~ Mod.)	Tuning gang fully open.	Across voice coil.	A1,A2 A3,A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001 Mfd. to reduce hum modulation.
2.	.01 Mfd.	"	1620KC (400~ Mod.)	"	"	A5	"
3.		Loop	1400KC (400~ Mod.)	Tune for max. output.	"	A6, A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.

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DATE 11/49 SET #77 FOLDER 9

PARTS LIST AND DESCRIPTIONS

REMLER
MODEL 6000

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RMA BASE TYPE	INSTALLATION NOTES
		REMLER PART No.	STANDARD REPLACEMENT		
V1	RF Amp.		12SK7	8N	
V2	Converter		12SA7	8R	
V3	IF Amp.		12SK7	8N	
V4	Det.-AVC-AF		12SQ7	8Q	
V5	Power Output		35L6GT	7AC	
V6	Rectifier		35Z5GT	6AD	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					IDENTIFICATION CODES AND INSTALLATION NOTES
	CAP.	VOLT	REMLER PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	
C1A	60	150		PRS150/80-40	EDL8415		TA-505	Filter - Red
B	40	150						Filter - Yellow
C2	100	25		PRS25/100	BRH251A		UHC-102	Output Cath. Byp. See Note
C3	.05	600		P688-05	GT6S5		TM-15	Antenna Isolation
C4	100	500		1468-0001	5W5T1	GP1K-100	1FM-31	Oscillator Grid Capacitor
C5	.05	400		P488-05	GT4S5		TM-15	AVC Filter
C6	470	500		1468-0005	5W5T5	GP2K-470	1FM-35	Diode RF Filter
C7	.004	600		P688-004	GT6D4	GP2M-005	TM-24	Audio Coupling
C8	500	500		1468-0005	5W5T5	GP2K-500	1FM-35	AF Plate Bypass
C9	.01	600		P688-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C10	.004	600		P688-004	GT6D4		TM-24	Output Plate Bypass
C11	.2	200		P488-22	GT4P2		72P53	Line Isolation
C12	.05	600		P688-05	GT6S5		TM-15	Line Filter

Note. Not used in all models.

CONTROLS

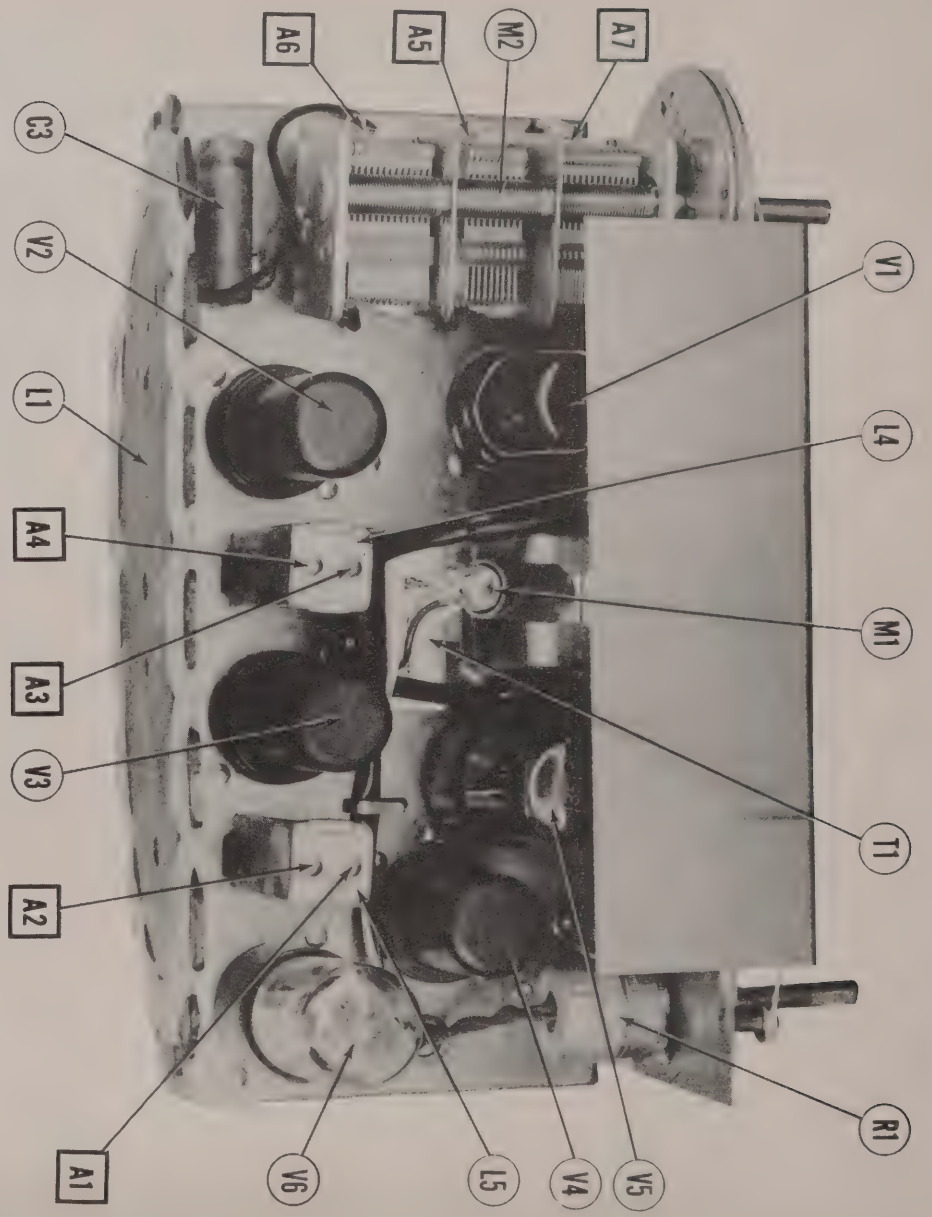
ITEM No.	RATING		REPLACEMENT DATA			INSTALLATION NOTES
	RESISTANCE	WATTS	REMLER PART No.	IRC PART No.	CLAROSTAT PART No.	
R1A	1 Meg	½		Q13-137	M-60-Z	Volume Control
B	Switch			76-1	SW-A	Attach to R1A Per Instructions

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	REMLER PART No.	IRC PART No.	
R2	50KΩ	½		BTS-47K	RF Grid
R3	100Ω	½		BW-½-100	RF Cathode - See note 1
R4	500KΩ	½		BTS-470K	Isolation
R5	50K	½		BTS-47K	RF Coil Shunt
R6	22KΩ	½		BTS-22K	Oscillator Grid
R7	220Ω	½		BW-½-220	IF Cathode - See note 1
R8	2.2 Meg	½		BTS-2.2 Meg	AVC Network
R9	10 Meg	½		BTS-10 Meg	AF Grid
R10	500KΩ	½		BTS-470K	AF Plate
R11	500KΩ	½		BTS-470K	Output Grid
R12	150Ω	1		BW-1-150	Output Cathode
R13	1500Ω	10		AB-1500	Filter (Wire Wound)
R14	50Ω	½			Rectifier Ballast

Note 1. Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		REMLER PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	3200Ω	3.5Ω	280Ω	.4Ω		A-3876	A-2928	RO-2	

SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			REMLER PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V.C. IMP.			46A1	
SP1	PM	3.5Ω				
	CONE DIA.	V.C. DIA.				
SP2	3 7/8" X 6"	9/16"				

R F COILS

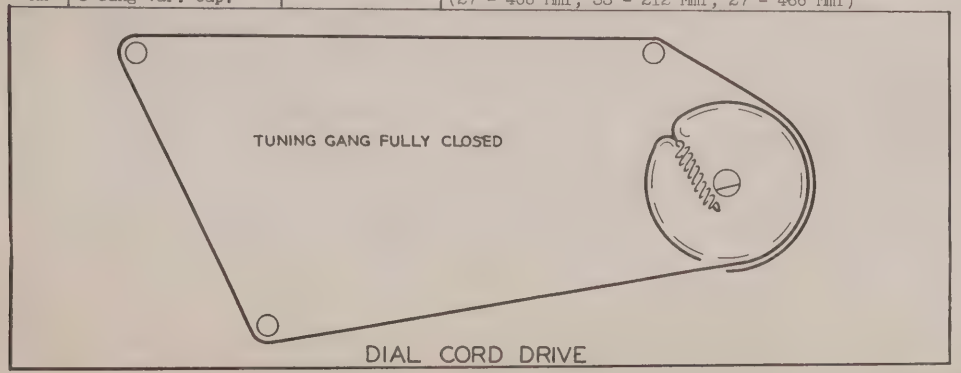
ITEM No.	USE	DC RES.		REPLACEMENT DATA		
		PRI.	SEC.	REMLER PART No.	MEISSNER PART No.	
L1	Loop Ant.	2Ω				
L2	RF Coil	83Ω	5.5Ω	L-30366	14-1057	
L3	Osc. Coil	.7Ω	5Ω	L-30230	14-1060	
L4	Input IF	19Ω	20Ω	L-30299-3	16-6678	
L5	Output IF	17Ω	17Ω	L-30299-4	16-6676	

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA		NOTES
					REMLER PART No.		
M1	Bayonet	6 - 8	.15	Brown			Type # 47

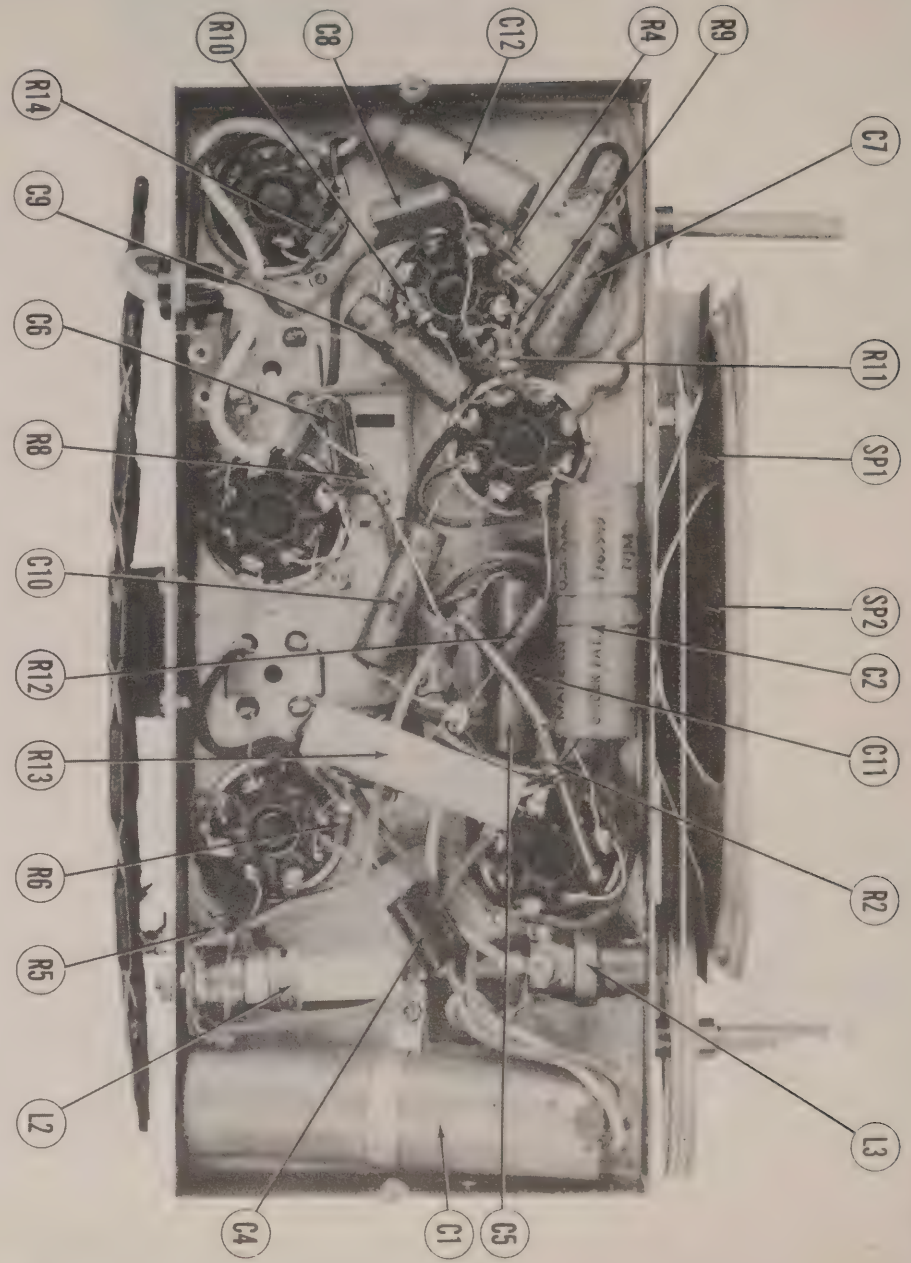
MISCELLANEOUS

ITEM No.	PART NAME	REMLER PART No.	NOTES
M2	3 Gang Var. Cap.		(27 - 466 Mmf, 33 - 212 Mmf, 27 - 466 Mmf)

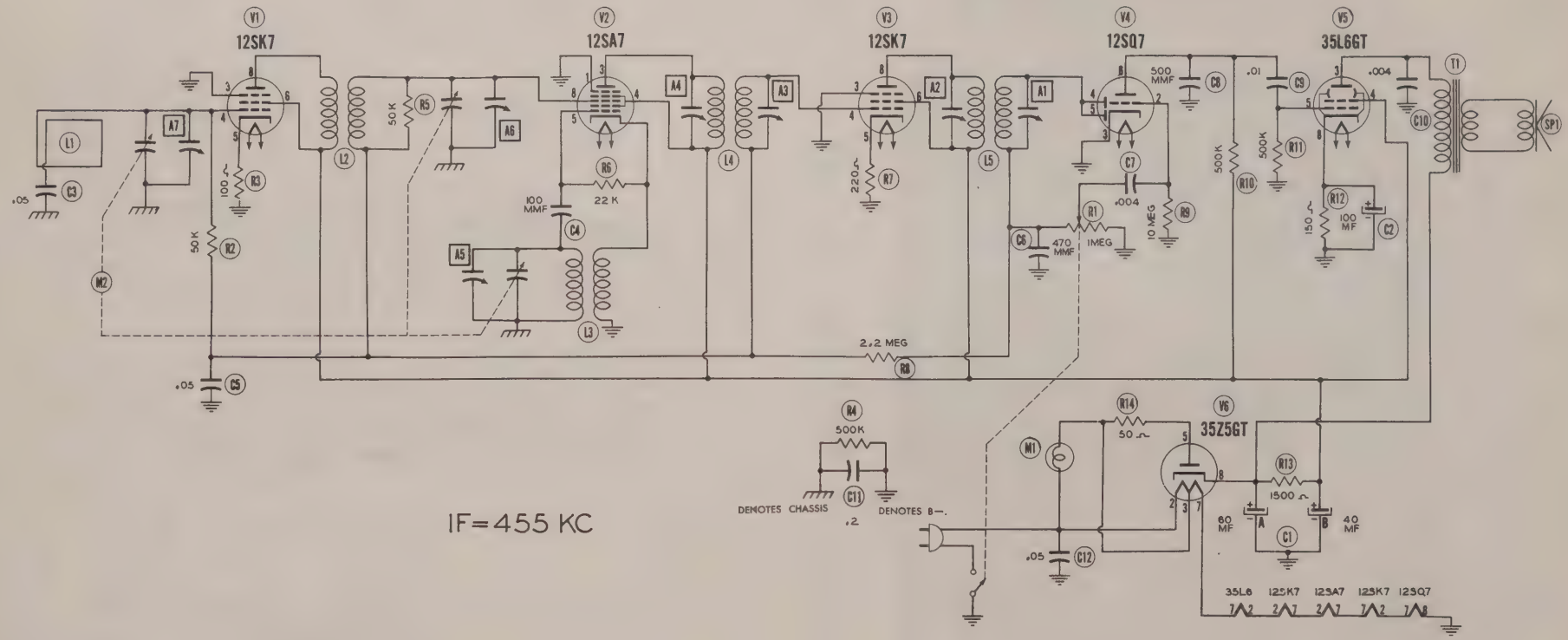


DIAL CORD DRIVE

CHASSIS—BOTTOM VIEW



REMLER MODEL 6000



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VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	0V	50VAC	0V	-.2VDC	0V	75VDC	39VAC	72VDC
V 2	12SA7	0V	39VAC	80VDC	75VDC	§-10VDC	0V	26VAC	-.2VDC
V 3	12SK7	0V	13VAC	0V	-.2VDC	0V	75VDC	26VAC	72VDC
V 4	12SQ7	0V	-.3VDC	0V	-.4VDC	-.4VDC	40VDC	13VAC	0V
V 5	35L6GT	4.7VDC	50VAC	107VDC	75VDC	.1VDC	0V	85VAC	4.7VDC
V 6	35Z5GT	0V	117VAC	114VAC	0V	110VAC	0V	85VAC	

§TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12SK7	500KΩ	50Ω	0Ω	3.3 Meg.	0Ω	†1.5KΩ	38Ω	†1.5KΩ
V 2	12SA7	500KΩ	38Ω	†1.5KΩ	†1.5KΩ	22KΩ	1Ω	25Ω	3.3Meg.
V 3	12SK7	500KΩ	12Ω	0Ω	3.3Meg.	0Ω	†1.5KΩ	25Ω	†1.5KΩ
V 4	12SQ7	500KΩ	10 Meg.	0Ω	1 Meg.	1 Meg.	†470KΩ	12Ω	0Ω
V 5	35L6GT	150Ω	50Ω	†280Ω	†1.5KΩ	470KΩ	0Ω	85Ω	150Ω
V 6	35Z5GT	Inf.	110Ω	108Ω	Inf.	150Ω	Inf.	85Ω	110KΩ

† Measured from pin 8 of V6.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

SILVERTONE
MODELS 101.761-2, 101.762-2

FIG. 1—TOP VIEW

GENERAL INFORMATION

The 101.761-2 and 101.762-2 record changers are designed to play automatically up to twelve 10-inch, ten 12-inch, or ten records intermixed in any order. On completion of the last record, the pickup arm will return to a rest position on the reject button and the mechanism will automatically shut off. Any record may be rejected while playing by pressing on the reject button.

These changers have been designed to operate on 110 volts, 60 cycles AC, unless otherwise indicated.

Manufactured by: **SEARS, ROEBUCK & CO., 925 S. HOMAN STREET, CHICAGO, ILLINOIS**

Parts Should Be Ordered from the Nearest Sears Retail Store or Mail Order Branch

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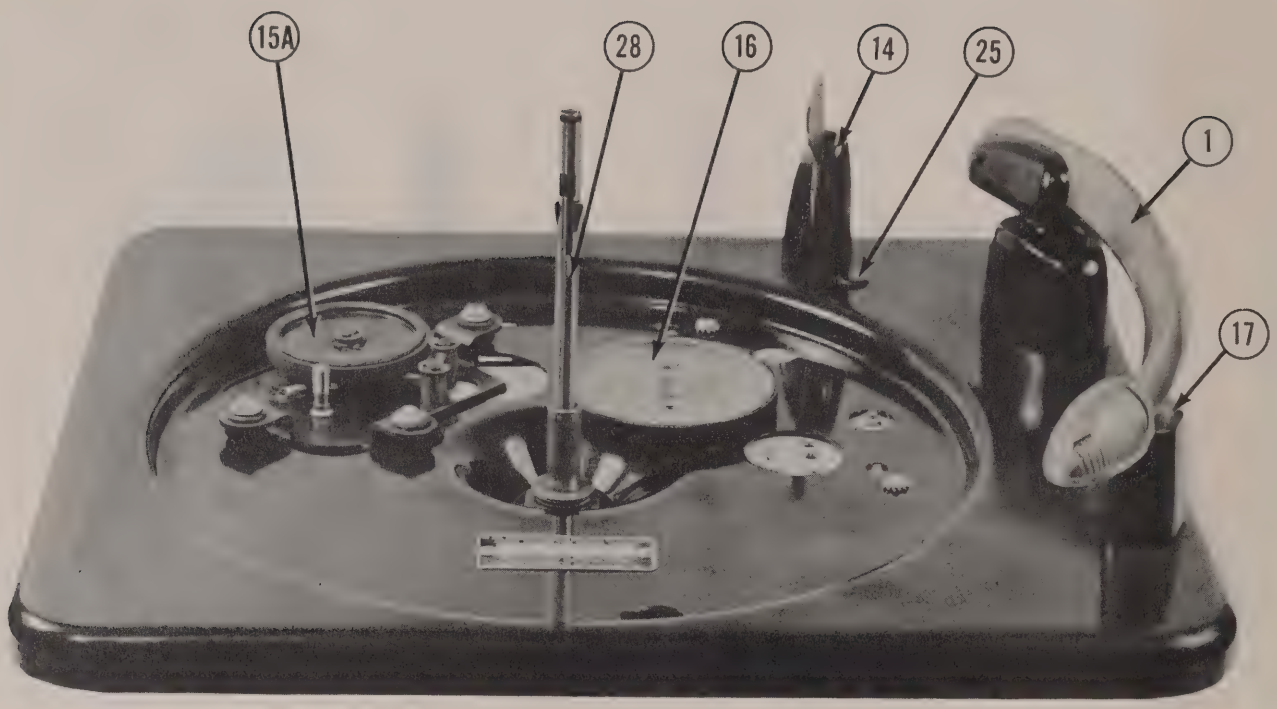

FIG. 2—TOP VIEW—LESS TURNTABLE

MANUAL OPERATION

All odd-size records, or home recordings, should be played manually. To play records manually, the following procedure is necessary:

1. Place the record to be played on the spindle, allowing it to rest on the spindle fingers.
2. Press down on the head of the pickup arm which is resting on the reject button (17). This starts the mechanism and change cycle, dropping the record to the turntable and moving the pickup arm into its proper playing position.
3. As in home recordings, which have no lead-in groove, or records that are smaller than a standard record, it will be necessary to place the needle in the first groove of the record.
4. On completion of standard records, the mechanism will be tripped, returning the pickup arm to its rest position on the reject button, and the mechanism will automatically shut off. In connection with records, such as home recordings, that do not have the eccentric trip grooves, the mechanism will have to be tripped by pressing on the reject button (17).
5. Remove the record by lifting straight up.

LOADING AND AUTOMATIC OPERATION

1. Place a stack of records (twelve 10-inch, ten 12-inch, or ten records intermixed in any order) on the spindle, allowing them to rest on the spindle fingers.
2. Press down on the head of the pickup arm which is in a rest position on the reject button (17). The changer will now play the entire stack of records and will automatically shut off on completion of the last record.
3. A record may be rejected at any time while playing by pressing on the reject button.
4. To turn off the changer, remove any records remaining on the spindle fingers. Press down on the reject button. The pickup arm will return to its rest position on the reject button and the changer will shut off automatically.

CHANGE CYCLE

As the pickup arm oscillates in the eccentric groove of the record, it causes the serrated end of the ratchet lever (37), which is fastened to the pickup arm outer sleeve assembly (7), to actuate the pawl of the trip lever (46). As a result, the trip lever is moved against the hinge lever bracket (48), thus tripping the hammer lever (60). The hammer lever now pivots against the top of the locking button (64B) pushing it down. This releases the pivot lever assembly (56) bringing the cycle idler wheel (16) into a positive frictional position with the hub of the turntable, starting the change cycle.

The pionion (63), rotating with the cycle idler wheel (16), drives the cam assembly (64) through the change cycle. As the cam assembly rotates, the locking button (64B) returns to a raised position by the retaining spring (64A).

The arm operating shaft and lever (55) are raised due to the incline portion on the outer edge of the cam assembly (64). As the operating lever raises it contacts the positioning lever (51) and, in turn, the middle sleeve assembly (44); as a result, the pickup arm is raised from the record. Also a frictional condition is set up when these parts come in contact with each other. The arm positioning lever (6), which is fastened to the other end of the operating lever, directs

FIG. 3—BOTTOM VIEW

the movement of the outer sleeve assembly (7) and, in turn, the pickup arm; therefore, as the pin of the operating lever follows the track of the cam assembly, the pickup arm is moved outward coming to a rest on the reject button and clearing the records. At this point, a flange on the outside edge of the cam assembly contacts the finger of the discriminator lever (43), resetting it with the discriminator trip (14).

As the pickup arm is moving outward, the flange (A) of the cam assembly (64) moves under the hammer lever (60) resetting it with the hinge lever bracket (48).

The pin of the finger operating lever (69E), riding in the groove on the bottom of the cam, now actuates the finger operating lever, which, in turn, operates the record selecting mechanism (28), thus dropping a record to the turntable.

The arm operating lever (55) now moves the pickup arm in for positioning, and the finger operating lever returns the selecting mechanism to its original position.

For 10-inch positioning, the discriminator lever (43) is held down by the step on the discriminator trip (14). This allows the positioning lever (51) to stay in contact and to move in with the operating lever (55), positioning the arm for 10-inch set down.

As a 12-inch record drops, the record strikes the discriminator trip (14). This releases the discriminator lever (43) allowing the hooked end to fall in the path of the positioning lever (51); therefore, as the arm operating lever (55) pivots the pickup arm in, the positioning lever (51), which moves with the lever (55), comes in contact with the discriminator lever (43). This prevents any further movement of the pickup arm, thus positioning the pickup arm for 12-inch set down.

The arm operating shaft and lever (55) are lowered by the inclined section of the cam, thereby lowering the pickup arm to the record and giving free movement to the pickup arm.

The cam stop lever (65), riding around the bottom edge of the cam (64), snaps the cam assembly into a locked position at the same time the locking button (64B) contacts the stop bracket (59) of the pivot lever (56). This moves the pivot lever away from the centerpost, thus disengaging the idler wheel (16) from the turntable hub. This completes the change cycle.

SHUT-OFF MECHANISM

The spring which is riveted on the end of the shut-off lever (69A) is responsible for holding the shut-off trip pawl (69G) away from the center of the cam (64); i.e., when pressure is applied to the spindle. When the last record drops to the turntable, pressure is released from the spindle assembly. This disengages the spring of the shut-off lever (69A) from the shut-off pawl (69G), allowing the pawl to be pulled in by the tension spring (69F).

When the mechanism is tripped, the change cycle is set in motion. The cam assembly will be rotated a half turn, moving the pickup arm out over the reject button. The shut-off button (64C) comes in contact with shut-off pawl (69G), causing the button to be raised. The pickup arm is now lowered to the reject button; the shut-off button (64C) moves against the switch actuating lever (38A) and the stop bracket (59) of the pivot lever assembly (56). The cam is snapped into position by the cam stop lever (65) causing the mechanism to be shut off and the disengagement of the cycle idler wheel (16) from the turntable hub.

A PHOTOFACT "EXPLODED" VIEW

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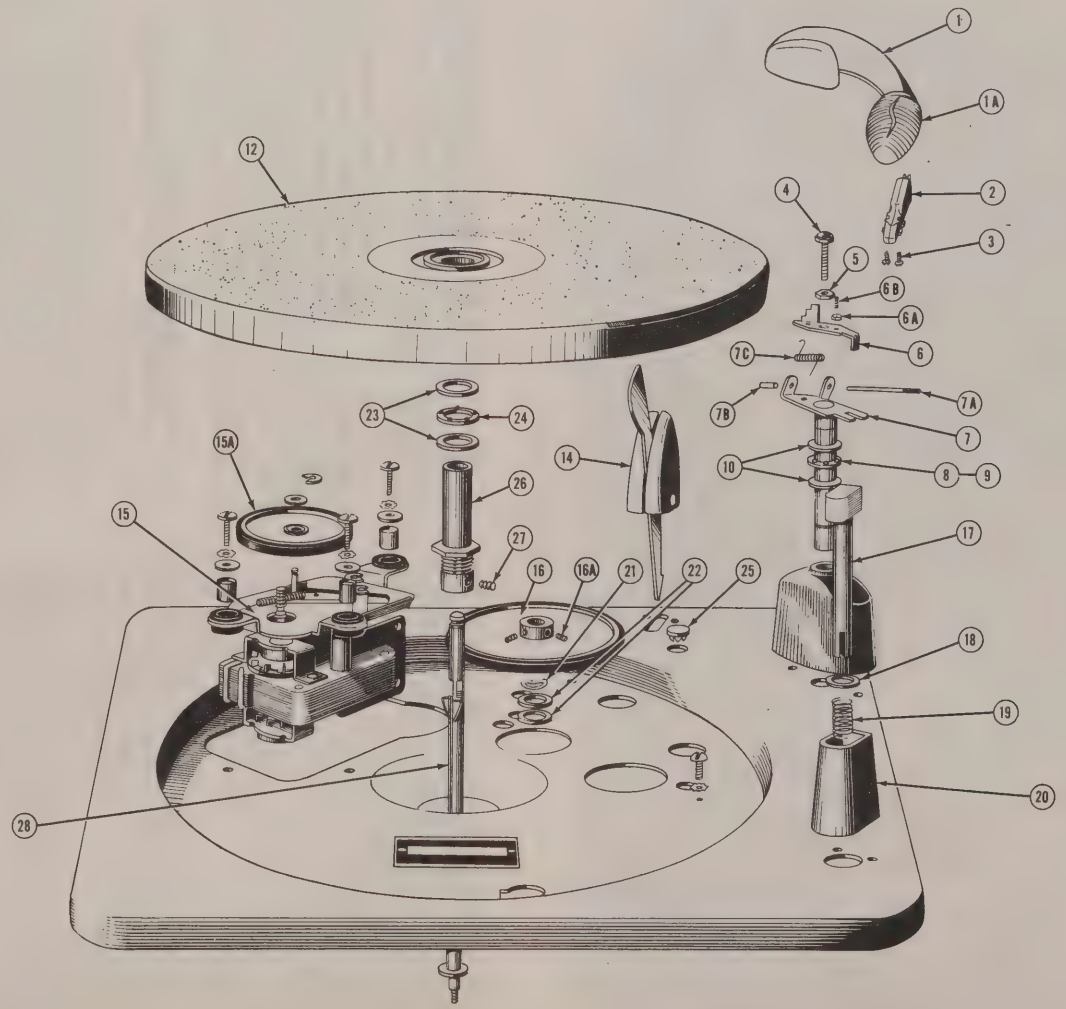

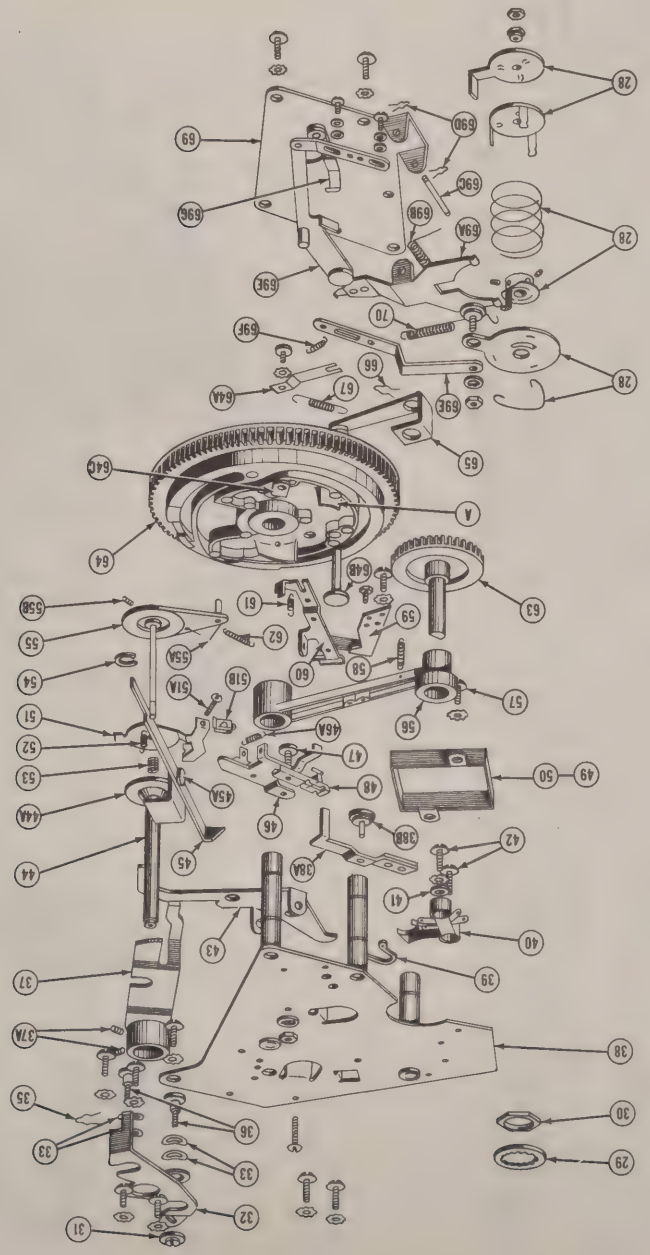
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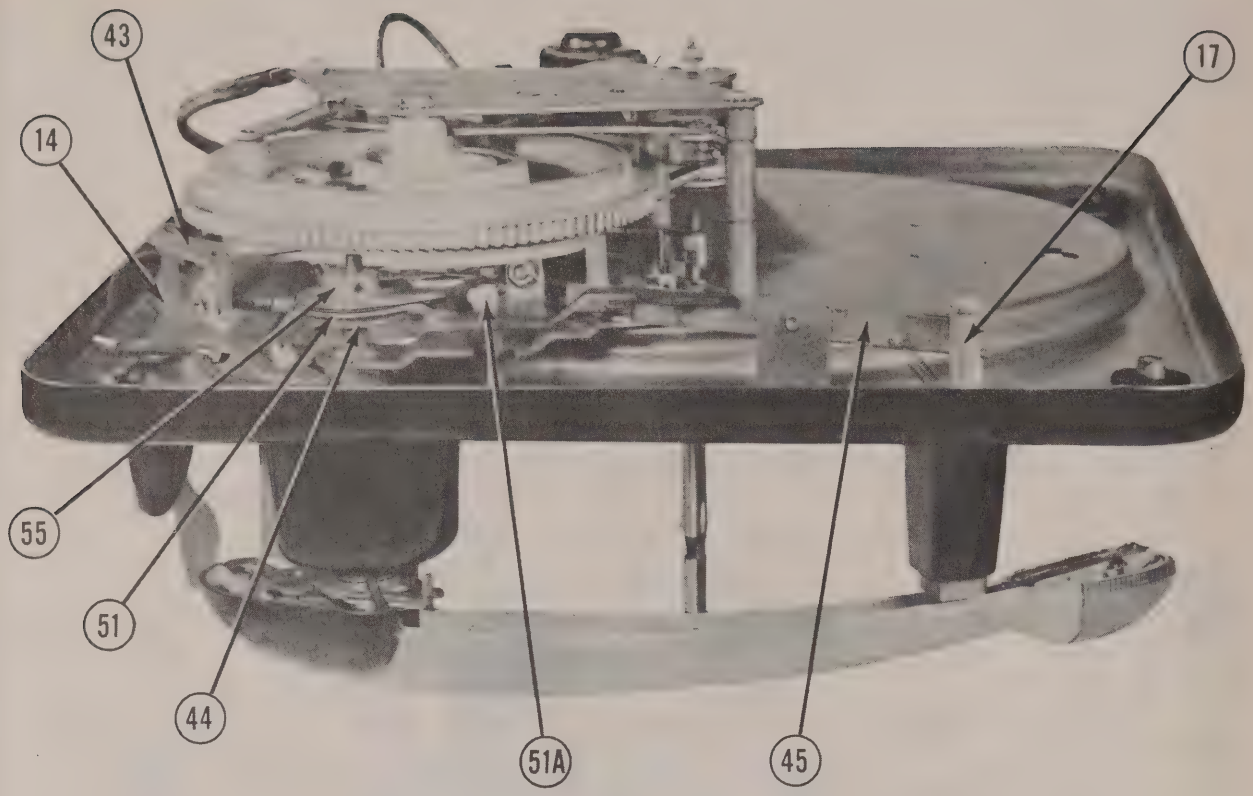

FIG. 4—BOTTOM VIEW—RIGHT SIDE

TROUBLES AND ADJUSTMENTS

Pickup Arm Does Not Move During the Change Cycle

1. Height adjusting screw (4) and nut (5) loose.

If the height adjustment nut (5) is loose, the arm positioning lever (6) may raise high enough to disengage the milled flats on the middle sleeve assembly (44). If this condition exists, the following adjustment must be made:

(a) Make sure the arm positioning lever (6) engages the milled flats on the middle sleeve assembly (44) and tighten the nut (5) enough to hold these parts in engagement.

(b) Adjust the screw (4) so that the pickup arm clears the reject button (17) by a minimum of 3/64" and just clears the flock on the turntable.

2. Arm operating lever (55) loose on shaft.

(a) With power plug out, trip the changer and rotate the turntable clockwise until the changer is in play position (out of cycle).

(b) Loosen the set screw (55B) enough so that the lever will slide on the shaft.

(c) Place a shim approximately .060 between positioning lever (51) and the middle sleeve assembly (44).

(d) Press up on the arm operating lever (55) to its full extent of travel.

(e) Using long-nose pliers, pull down the operating shaft until it touches the cam.

(f) With continued pressure on the bottom of the arm operating lever (55) (by the left thumb), push down on the pickup arm (with the left fingers) as far as it will go. Be sure the pickup arm is clear of the reject button.

(g) Tighten the set screw and remove the shim.

(h) The pickup arm height may now be properly adjusted by the adjustment screw (4) (see above).

Needle Does Not Position Properly for 10-Inch Record

1. Proper adjustment is made by rotating the eccentric screw (31) located back of the pickup arm post on the top of the base plate.

(a) Rotate the screw clockwise or counterclockwise, until the condition is corrected.

2. If the pickup arm is irregular in dropping action, check the following:

(a) Check for grease or foreign matter between the clutch surfaces of the arm operating lever (55), positioning lever (51) and the middle sleeve assembly (44).

(b) Check the height adjusting screw (4) to see if it is tight. (See "Pickup Arm Does Not Move During the Change Cycle 1.")

(c) The arm operating lever (55) loose on the shaft. (See "Pickup Arm Does Not Move During the Change Cycle 2.")

Needle Does Not Position Properly for 12-Inch Record

1. Proper adjustment is made by the adjusting screw (51A) of the positioning lever (51).

(a) Rotate the screw clockwise or counterclockwise until the condition is corrected.

2. If the pickup arm is irregular in dropping action, check the following:

(a) Check for grease or foreign matter between the clutch surfaces of the arm operating lever (55), positioning lever (51), and the middle sleeve assembly (44).

(b) Check the height adjusting screw (4) to see

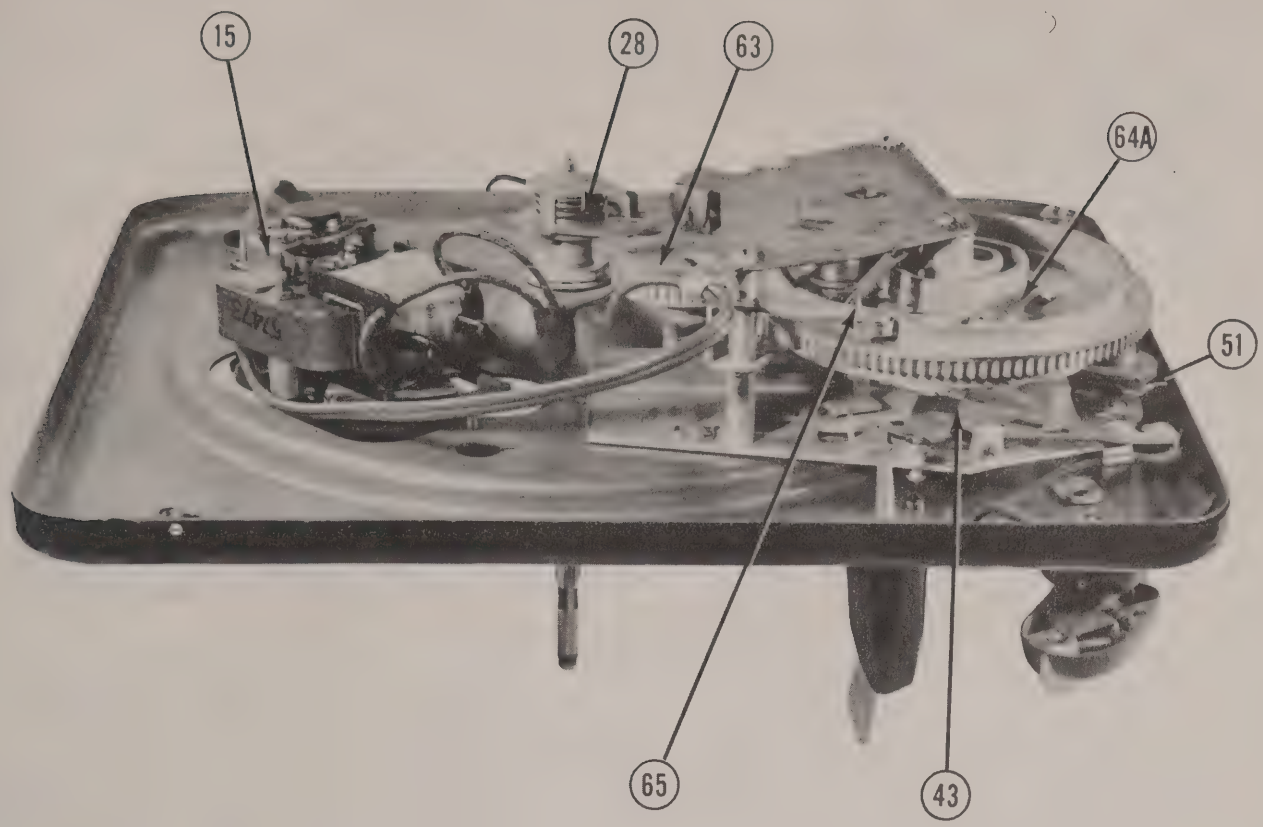

FIG. 5—BOTTOM VIEW—BACK

if it is tight. (See "Pickup Arm Does Not Move During the Change Cycle 1.")

(c) The arm operating lever (55) loose on the shaft. (See "Pickup Arm Does Not Move During the Change Cycle 2.")

Changer Cycles Continuously

1. Button retaining spring (64A) loose or too weak to actuate the locking button (64B).
2. Reject button (17) binding.
3. Hinge lever bracket (48) binding.
4. Hammer lever (60) not being reset with the hinge lever bracket (48).

Pickup Arm Does Not Drop for 12-Inch Record

1. Discriminator lever (43) bent. Not contacting the flange on the positioning lever (51).
2. The discriminator lever out of adjustment.

(a) With power plug out, trip the changer and rotate the turntable until the pickup arm raises.

(b) Push back on the discriminator trip (14).

(c) Remove the plug button (25).

(d) Adjust the screw until the discriminator lever will approximately strike the center of the flange of the positioning lever (51).

(e) Tighten the lock nut.

(f) Replace the plug button.

(g) Check the adjustment.

Changer Stalls During the Change Cycle But Turntable Continues to Rotate

1. Grease, or foreign matter, on the turntable hub and cycle idler wheel (16).

Clean with alcohol or naphtha.

Turntable Speed Irregular

1. Grease, or foreign matter, on the turntable rim idler pulley (15A).

Clean with alcohol or naphtha.

Changer Shuts Off Before All the Records Have Been Played

1. The spring catch on the end of the shutoff lever (69A) bent and will not hold the shutoff pawl lever (69G) away from the center of the cam.

(a) Bend the shutoff lever (69A) spring up slightly and check the adjustment.

Changer Fails to Shut Off on Completion of Last Record

1. Spring finger on the shut-off lever (69A) bent up too far holding the shut-off pawl (69G) in locked position.

(a) Bend down slightly.

2. Spindle assembly binding preventing the spindle from having any vertical movement.

LUBRICATION

These changers are lubricated at the factory and should not require any additional lubrication; however, should it become necessary to lubricate the changer, due to excessive use or high operating temperatures, the changer should be lubricated as follows:

Use a good, light grease on the

1. Bearing assembly (24).
2. Spindle assembly (28).
3. Cam assembly (64).

Do not allow any grease to come in contact with the clutch surfaces of the middle sleeve assembly (44), positioner lever (51), the arm operating lever (55), the rubber tires of the idler pulley (15A), and the cycle idler wheel (16) and their drive surface. If grease should come in contact with these parts, clean them with alcohol or naphtha.

PARTS LIST

Item No.	Part No.	DESCRIPTION
1	R55194	Arm—pickup (with decorative cap)
1A	R57584	Cap—decorative
2	R65101	Pickup cartridge—syntronic (grounded)
3	R57888	Screw—syntronic pickup attaching
4	R57447	Screw—No. 8-32 special
5	R410-8	Nut—No. 8-32 hex
6	R65347	Arm positioning lever assembly
6A	R410-4	Nut—No. 4-40 hex
6B	R372-8	Screw—No. 4-40 x ¼ lg. headless set
7	R57591	Outer sleeve assembly—pickup arm
7A	R57682	Sleeve assembly—pickup arm
7B	R57681	Sleeve—hinge pin
7C	R57813	Spring—hinge
8	R57643	Cage—ball
9	R63891	Ball—.0625 diameter (7 used)
10	R57644	Washer—flat—balls retaining
12	R57345	Turntable assembly
14	R57816	Post assembly—discriminator
15	R57473	Motor—Russel—60 cycle, 117 V.
15A	R49655	Pulley—idler
16	R57424	Wheel assembly—idler
16A	R374-6	Screw—set—No. 8-32 x 3/16
17	R57807	Button assembly—reject
18	R4536	Washer—flat
19	R57445	Spring—button post
20	R57478	Post—reject button
21	R60439	Washer—spring
22	R8003	Washer—flat
23	R57382	Washer—hardened—flat
24	R57448	Bearing assembly
25	R57665	Button—plug
26	R57449	Bushing assembly—spindle mounting
27	R57378	Screw—spindle locking
28		Replace with R57858 spindle kit
29	R402-28	Washer—lock—⅝ int. tooth
30	R57395	Nut—⅝—24 hex
31	R57484	Eccentric—adjusting
32	R57486	Lever—adjusting
33	R57487	Washer—spring
35	R57446	Clip—retaining
36	R57485	Screw—No. 6-32 shouldered
37	R57808	Lever—assembly—ratchet
37A	R374-6	Screw—set—No. 8-32 x 3/16
38	R67096	Top plate and spacer assembly
38A	R57422	Switch actuating assembly
38B	R57479	Rivet—shouldered
39	R57499	Washer—spring mounting
40	R57405	Switch—on-off
41	R913	Washer—flat
42	R202-7	Screw—No. 4-40 x 7/16
43	R57677	Lever—discriminator
44	R57683	Middle sleeve assembly—pickup arm
44A	R57667	Washer—neoprene
45	R57895	Lever—manual trip
45A	R57479	Rivet—shouldered

Item No.	Part No.	DESCRIPTION
46	R57423	Hammer trip lever assembly
46A	R57600	Spring—ratchet pawl
47	R57383	Screw—No. 4-40 x ¼ long—fil. hd.
48	R57631	Hinge lever bracket assembly
49	R57401	Cover—switch
50	R57831	Insulator—paper
51	R57669	Lever assembly—positioning
51A	R203-6	Screw No. 6-32 x ⅜
51B	R61790	Nut—speed No. 6-32
52	R57598	Spring—tension
53	R57814	Spring—compression
54	R13335	Washer—"C"—retaining
55	R57668	Arm operating lever assembly (complete)
55A	R57666	Spring—positioning lever
55B	R372-8	Screw—No. 4-40 x ¼ headless
56	R57630	Pivot lever assembly
57	R65185	Screw—No. 4-40 x 3/16
58	R57602	Spring—pivot lever
59	R57394	Bracket—stop
60	R57371	Lever—hammer
61	R57601	Spring—hammer lever
62	R57606	Spring—arm operating lever
63	R57825	Pinion assembly
64	R57686	Cam assembly
64A	R57411	Spring—button retaining
64B	R57414	Button—locking
64C	R57457	Shut-off button assembly
65	R57416	Cam stop lever assembly
66	R57446	Clip—retaining
67	R57609	Spring—cam stop lever
69	R57811	Bottom plate assembly
69A	R57418	Shut-off lever assembly
69B	R57608	Spring—shut-off lever
69C	R57353	Pin—shut-off lever
69D	R16503	Clip—retaining
69E	R57663	Finger operating lever assembly
69F	R57598	Spring—tension
69G	R57359	Pawl—shut-off lever
	R60493	Ball—.125 dia.—cam assembly
	R57597	Spring—shut-off button retaining—cam assembly
	R57492	Bottom pan assembly
	R65120	Bumper
	R63589	Spacer—knob
	R57349	Knob—bottom pan
	R65555	Cover—knob
	R57572	Spring—compression—chgr. mtg.
	R57611	Cord—line
	R57272	Plug—1 prong—phono
	R57569	Spacer—shipping
	R56696	Lead—pickup—cotton overbraid
	R57694	Pad—rest—pickup arm
	R64780	Slide—bottom
	R64779	Slide—top
	R63299	Ball retainer assembly

PHOTOFACT* Folder

TRUETONE MODELS
D1991, B, D1993, B, D1994

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MODEL D1994

TRUETONE MODELS
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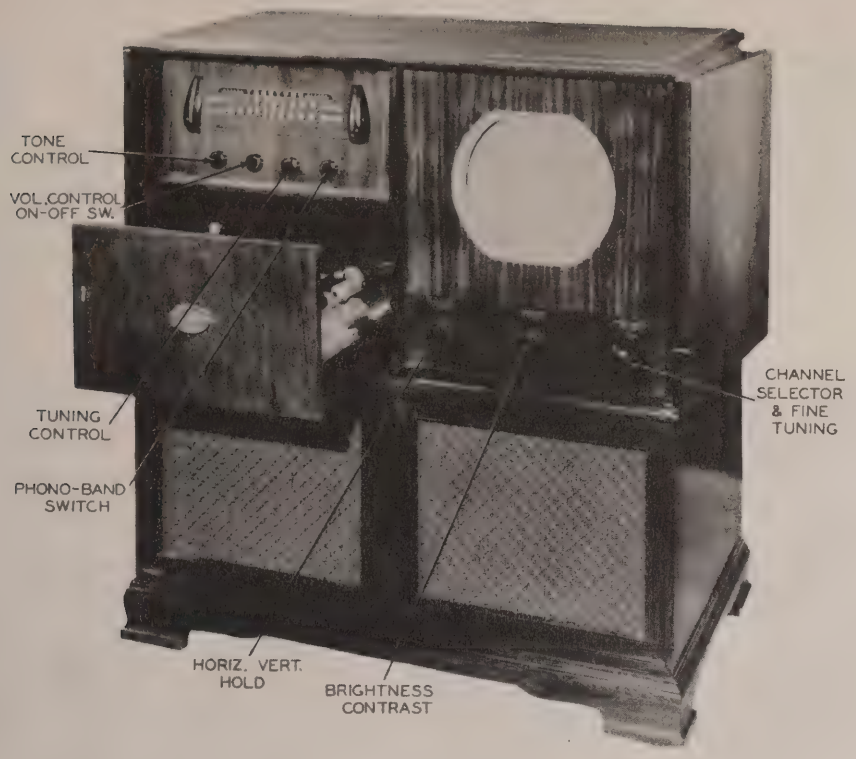

Truetone Model D-1994

TRADE NAME	Truetone Models D-1991, D-1991B, D-1993, D-1993B, D-1994
SUPPLIER	Western Auto Supply Co., 2107 Grand Ave., Kansas City, Mo.
TYPE SET	FM-AM-Phono-TV Combination Receiver (Some Models TV only.)
TUBES	Thirty (TV-Radio Models) Twenty-One (TV Only Models)
POWER SUPPLY	105-125 Volts AC-60 Cycles
TUNING RANGE	AM 540-1600KC FM 88-108MC TV Channels 2 thru 13
RATING:	1.8 Amp. @ 117 Volts AC (TV) .78 Amp. @ 117 Volts AC (Radio)

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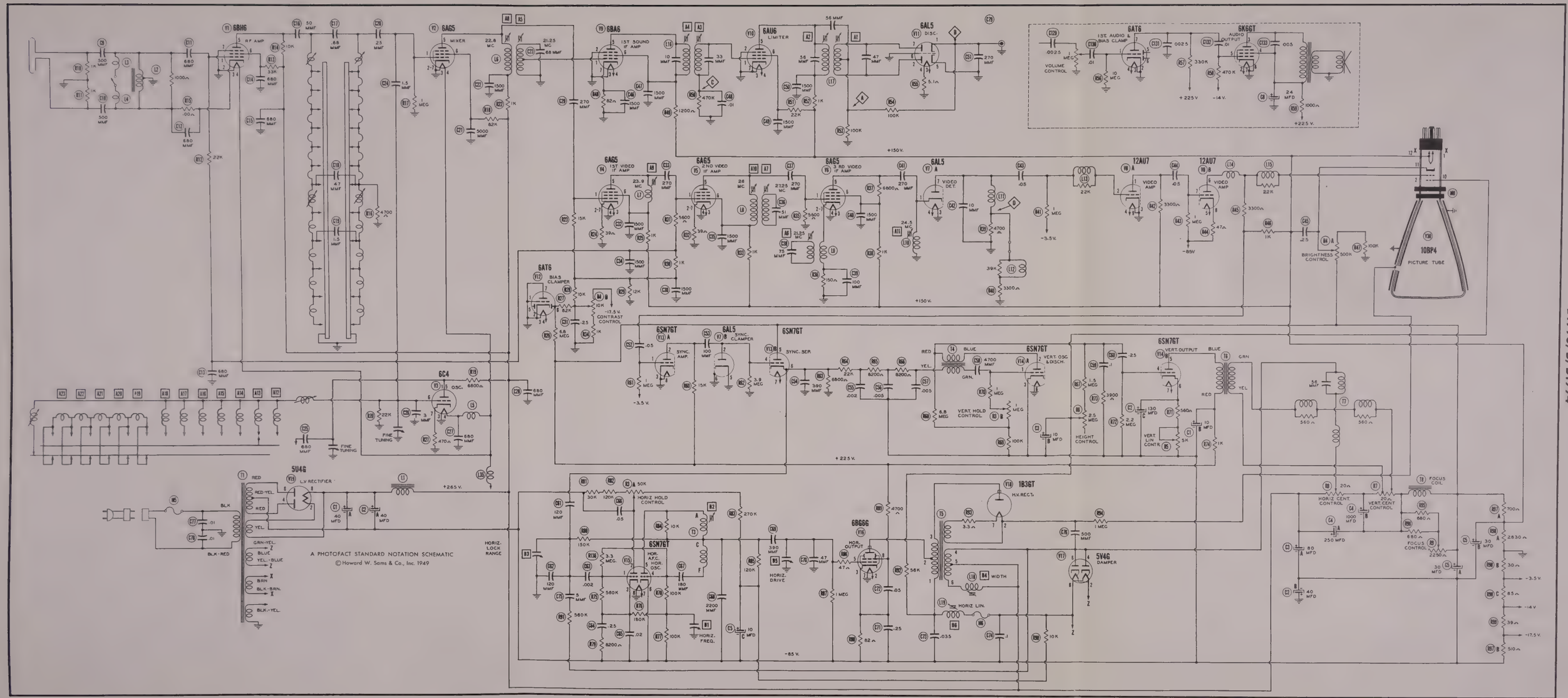
TRUETONE MODELS D1991, B, D1993, B, D1994
6BH6
RF AMP
6AG5
MIXER
6BA6
1ST SOUND IF AMP
6AU6
LIMITER
6AL5
DISC.
6AT6
1ST AUDIO & BIAS CLAMP
6K6GT
AUDIO OUTPUT
VOLUME CONTROL
+225 V.
-14 V.
+150 V.
6AG5
1ST VIDEO IF AMP
6AG5
2ND VIDEO IF AMP
6AG5
3 RD. VIDEO IF AMP
6AL5
VIDEO DET.
12AU7
VIDEO AMP
12AU7
VIDEO AMP
-85 V.
6AT6
BIAS CLAMPER
-17.5 V.
CONTRAST CONTROL
BRIGHTNESS CONTROL
10BP4
PICTURE TUBE
6SN7GT
SYNC. AMP.
6AL5
SYNC. CLAMPER
6SN7GT
SYNC. SEP.
-3.5 V.
6SN7GT
VERT. OSC. & DISCH.
VERT. HOLD CONTROL
HEIGHT CONTROL
6SN7GT
VERT. OUTPUT
VERT. LIN CONTR.
+225 V.
6C4
OSC.
FINE TUNING
FINE TUNING
5U4G
LV RECTIFIER
+265 V.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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HORIZ. LOCK RANGE
6SN7GT
HOR. AFC, HOR. OSC
HORIZ. FREQ.
HORIZ. HOLD CONTROL
6BG6G
HORIZ. OUTPUT
HORIZ. DRIVE
1B3GT
H.V. RECT.
5V4G
DAMPER
WIDTH
HORIZ. LIN.
HORIZ. CENT. CONTROL
VERT. CENT. CONTROL
FOCUS COIL
FOCUS CONTROL
-3.5 V.
-14 V.
-17.5 V.

CHASSIS TOP VIEW

CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

TUBE PLACEMENT CHART

TV-ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

If receiver is to be aligned with picture tube removed, it is recommended to also remove the 6SN7GT (V15) horizontal oscillator tube to eliminate high voltage shock hazard.
When complete alignment is required, it is recommended that it be done in the order given below.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	.05MFD	High side to pin 1 (Grid) of 6AU6 (V10). Low side to chassis.	21.25MC (Unmod.)	13	DC Probe thru 1 Meg. to Point (A) Common to chassis.	A1,A2	Detune A1. Adjust A2 for maximum deflection.
2.	.05MFD	"	"	"	DC Probe thru 1 Meg. to Point (B) Common to chassis.	A1	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
3.	.05MFD	High side to pin 1 (Grid) of 6BA6 (V9). Low side to chassis.	"	"	DC Probe thru 1 Meg. to Point (C) Common to chassis.	A3,A4	Adjust for maximum deflection.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.05MFD	High side to pin 1 (Grid) of 6BA6 (V9). Low side to chassis.	21.25MC (1MC Sweep)	21.25MC	13	Vert. Amp. to Point (C) Low side to chassis.	A3,A4	If 60\ sweep is used, shunt R50 with 5600Ω. Adjust A3, A4 for maximum amplitude and symmetry as per Fig 1.
2.	.05MFD	"	"	"	"	Vert. Amp. to Point (B) Low side to chassis.	A1,A2	Adjust A2 for maximum amplitude and straightness of diagonal line as per Fig 2. Adjust A1 so 21.25MC marker is at center of diagonal line. Continue with step 4.

VIDEO IF ALIGNMENT

Before starting video IF alignment, connect VTVM between junction of R28 and R29 and chassis. Adjust contrast control for reading of -3 volts. Leave contrast control at this setting for entire video IF alignment.
Remove 6C4 local oscillator tube (V3) to prevent erroneous indications.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	21.25MC	13	DC Probe to Point (D) Common to chassis.	A5,A6	Adjust for minimum deflection.
5.		"	27.25MC	"	"	A7	"
6.		"	22.8MC	"	"	A8	Adjust for maximum deflection.
7.		"	23.9MC	"	"	A9	"
8.		"	26.0MC	"	"	A10	"
9.		"	24.5MC	"	"	A11	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the signal generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.		High side to ungrounded tube shield floating over mixer tube (V2). Low side to chassis.	24MC (10MC Sweep)	21.25MC 23.0MC 25.0MC 25.75MC 27.25MC	13	Vert. Amp. to Point (D) Low side to chassis.		Check response curve obtained on scope. If necessary retouch A5 thru A11 for proper wave shape and placement of markers as per Fig 3.

OSCILLATOR ALIGNMENT

The RF and mixer lines of the tuner used in this receiver are pre-set at the factory and normally do not require adjustment in the field.
To align the oscillator circuits the sound IF system must be accurately aligned. Set the fine tuning control to the midpoint of its range and proceed as follows.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	Two 125Ω carbon res.	Across antenna terminals with 125Ω resistor in each generator lead.	215.75MC	13	DC Probe thru 1 Meg. to Point (B) Common to chassis.	A12	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
12.	"	"	209.75MC 203.75MC 197.75MC 191.75MC 185.75MC 179.75MC 87.75MC 81.75MC 71.75MC 65.75MC 59.75MC	12 11 10 9 8 7 6 5 4 3 2	"	A13 A14 A15 A16 A17 A18 A19 A20 A21 A22 A23	"

RADIO ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
13	.1MFD	High side to pin 7 (Grid) of 12AT7 (V21). Low side to chassis.	455KC (400∿ Mod.)	AM (3rd position clockwise)	Tuning gang fully open	Across voice coil	A24, A25, A26, A27	Adjust for maximum output.
14	200MMFD	High side to dipole antenna terminal. Low side to chassis.	1620KC	"	"	"	A28	"
15	200MMFD	"	1400KC	"	Tune for maximum signal. Set pointer at 1400KC on dial.	"	A29, A30	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
16	.01MFD	High side to pin 1 (Grid) of 6BA6 (V23). Low side to chassis.	10.7MC (Unmod.)	FM (Fully clockwise)	Tuning gang fully open	DC Probe to Point (E) Low side to chassis.	A31	Adjust for maximum deflection.
17	.01MFD	"	"	"	"	DC Probe to Point (E) Common to chassis.	A32	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
18	.01MFD	High side to pin 1 (Grid) of 6BA6 (V22). Low side to chassis.	"	"	"	DC Probe to point (E) Common to chassis.	A33, A34	Alternately load the primary and secondary windings with 1000Ω. (That is, when adjusting the secondary shunt the primary with 1000Ω and vice-versa.) Repeat steps 16 and 17.
19	.01MFD	High side to FM RF section of tuning gang. Low side to chassis.	"	"	"	"	A35, A36	Alternately load primary and secondary as above with 1000Ω, and adjust for max. deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
16	.01MFD	High side to pin 1 (Grid) of 6BA6 (V22). Low side to chassis.	10.7MC (450KC Sweep)	FM	Point of non interference	Vert. Amp. to Point (E) Low side to chassis.	A31, A33, A34	Disconnect stabilizer capacitor C7. Adjust for maximum amplitude and symmetry as per Fig 4.
17	.01MFD	High side to pin 7 (Grid) of 12AT7 (V21). Low side to chassis.	"	"	"	"	A35, A36	"
18	.01MFD	"	"	"	"	Vert. Amp. to Point (F) Low side to chassis.	A32	Reconnect stabilizer capacitor C7. Adjust A32 so crossover point occurs at center of pattern as per Fig 5. Slightly retouch A31 for maximum amplitude and straightness of crossover lines. Continue with step 20.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
20	300Ω carbon res.	High side thru 300Ω to terminal 1 of dipole terminal strip. Low side to chassis.	108.4MC (Unmod.)	FM	Tuning gang fully open	DC Probe to Point (E) Common to chassis.	A37	Adjust for maximum deflection.
21	"	"	104.5MC (Unmod.)	"	Tune for maximum signal	"	A38, A39	Adjust for maximum deflection. Repeat steps 20 and 21 to assure accurate oscillator and RF alignment.

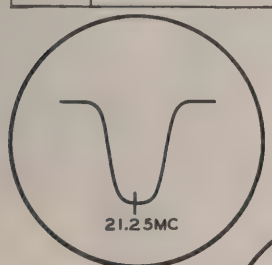


FIG. 1

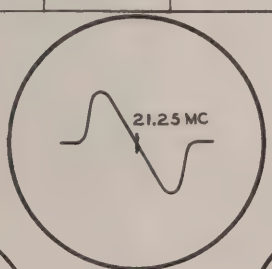


FIG. 2

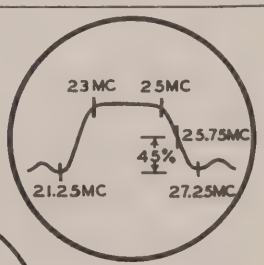


FIG. 3

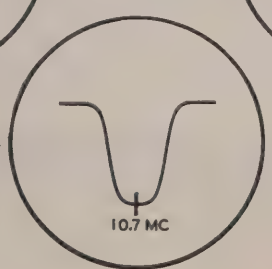


FIG. 4

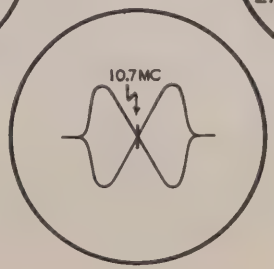


FIG. 5

TRUETONE MODELS D1991, B, D1993, B, D1994

VOLTAGE AND RESISTANCE MEASUREMENTS

VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	-.8VDC	.8VDC	0V	6.3VAC	190VDC	175VDC	0V		
V 2	6AG5	-.3VDC	0V	0V	6.3VAC	250VDC	95VDC	0V		
V 3	6C4	195VDC	0V	0V	6.3VAC	195VDC	§-3 VDC	4.3VDC		
V 4	6AG5	-1VDC	.3VDC	6.3VAC	0V	125VDC	125VDC	.3VDC		
V 5	6AG5	-1VDC	.2VDC	6.3VAC	0V	125VDC	125VDC	.2VDC		
V 6	6AG5	0V	1.3VDC	6.3VAC	0V	80VDC	125VDC	1.3VDC		
V 7	6AL5	0V	-.8VDC	0V	6.3VAC	0V	0V	-.1VDC		
V 8	12AU7	120VDC	-.8VDC	0V	6.3VAC	6.3VAC	♯150VDC	# 0V	♯.7VDC	0V
V 9	6BA6	0V	0V	0V	6.3VAC	117VDC	117VDC	1.2VDC		
V 10	6AU6	0V	0V	0V	6.3VAC	130VDC	100VDC	0V		
V 11	6AL5	.1VDC	-.3VDC	6.3VAC	1.3VAC	0V	0V	-.3VDC		
V 12	6AT6	0V	0V	0V	6.3VAC	0V	-.1VDC	0V		
V 13	6SN7GT	-.8VDC	147VDC	0V	-.9VDC	215VDC	7VDC	6.3VAC	0V	
V 14	6SN7GT	♯-1.2VDC	♯75VDC ♯135VDC	0V	# 0V	♯290VDC	♯5VDC ♯16VDC	6.3VAC	0V	
V 15	6SN7GT	♯-1.9 VDC	♯105VDC	♯-5.2 VDC	♯-43VDC	♯145VDC	# 0V	6.3VAC	0V	
V 16	6BG6G	0V	6.3VAC	♯8VDC	# 0V	♯0V	# 0V	0V	♯250VDC	TOP CAP *
V 17	5V4G	0V	320VDC	320VDC	250VDC	0V	250VDC	0V	320VDC	
V 18	1B3GT	* DO NOT MEASURE.								
V 19	5U4G	0V	265VDC	0V	380VAC	0V	380VAC	0V	265VDC	
V 20	6BA6	-.1VDC	0V	0V	6.3VAC	240VDC	127VDC	.6VDC		
V21A	12AT7	230VDC	§-6.2 VDC	.1VDC	0V	0V	227VDC	0V	5VDC	6.3VAC
‡ V21B	12AT7	233VDC	§-.4 VDC	.1VDC	0V	0V	232VDC	0V	4.4VDC	6.3VAC
V22	6BA6	0V	0V	0V	6.3VAC	237VDC	90VDC	.6VDC		
‡ V23	6BA6	0V	0V	0V	6.3VAC	225VDC	100VDC	.8VDC		
‡ V24	6AL5	.1VDC	.1VDC	0V	5.4VAC	.2VDC	0V	-.2VDC		
V25	6AV6	-.5VDC	0V	0V	6.3VAC	0V	-.3VDC	90VDC		
V26	6AV6	-.5VDC	0V	0V	6.3VAC	0V	0V	100VDC		
V27	6K6GT	0V	6.3VAC	320VDC	250VDC	0V	0V	0V	21VDC	
V28	6K6GT	100VDC	6.3VAC	320VDC	250VDC	0V	0V	0V	21VDC	
V29	5Y3GT	0V	335VDC	0V	320VAC	0V	320VAC	0V	335VDC	
V30	10BP4	135VDC	60VDC	PIN 10 310VDC	PIN 11 210VDC	PIN 12 135VDC				

Note 1: Contrast Control Set At Maximum For These Measurements.

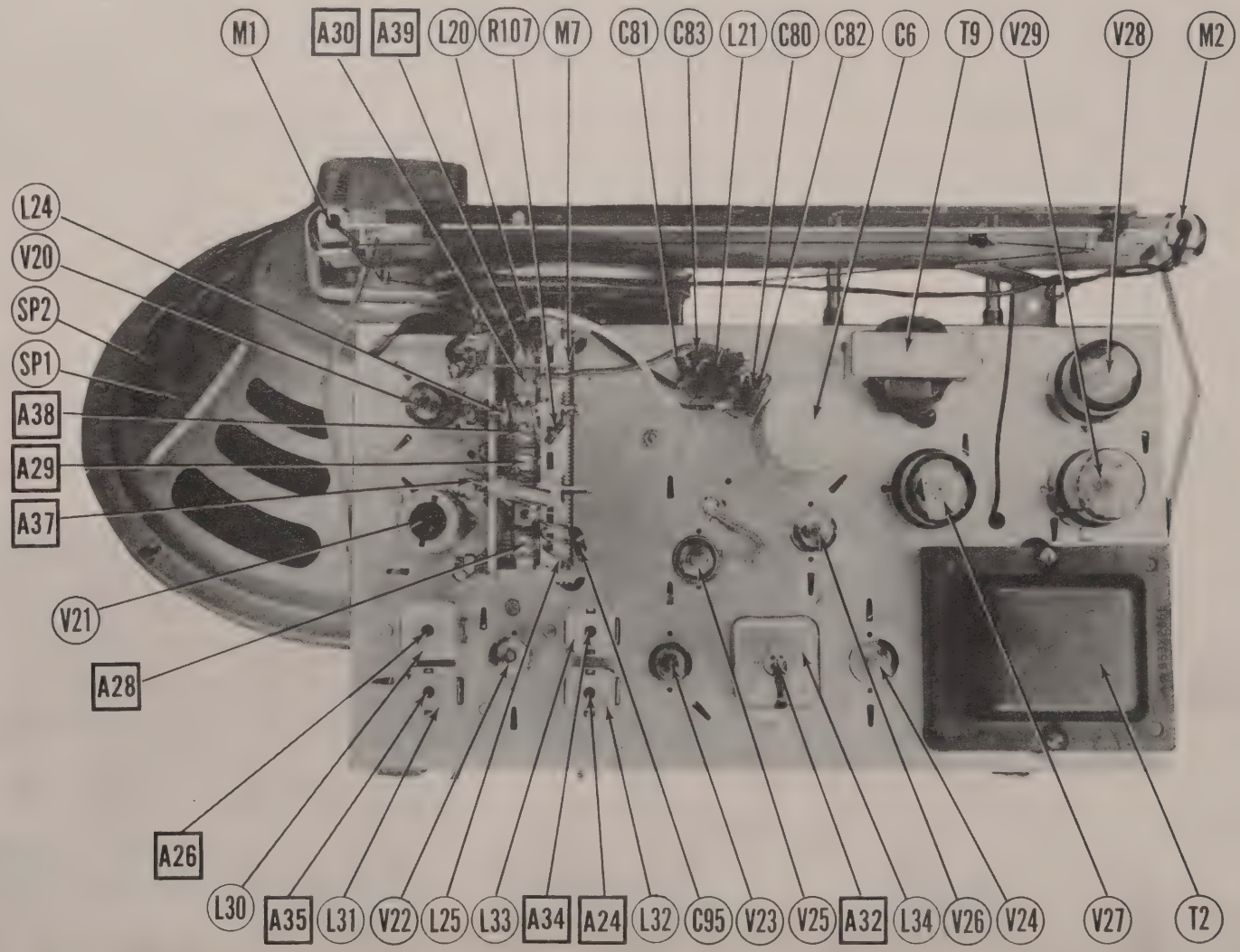
‡ Taken In FM Position.
§ Taken With Vacuum Tube Voltmeter.
♯ Measured From Pin 6 Of V15.
♦ Measured From Pin 8 Or V17.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BH6	27KΩ	100Ω	0Ω	.1Ω	†10KΩ	†33KΩ	0Ω		
V 2	6AG5	1 Meg.	0Ω	0Ω	.1Ω	†1.5KΩ	†82KΩ	0Ω		
V 3	6C4	†7.5KΩ	Inf.	0Ω	.1Ω	†7.5KΩ	22KΩ	470Ω		
V 4	6AG5	23KΩ	39Ω	.1Ω	0Ω	†2KΩ	†2KΩ	39Ω		
V 5	6AG5	13KΩ	39Ω	.1Ω	0Ω	†2KΩ	†2KΩ	39Ω		
V 6	6AG5	5.6KΩ	150Ω	.1Ω	0Ω	†8.5KΩ	†2KΩ	150Ω		
V 7	6AL5	0Ω	4 Meg.	0Ω	.1Ω	0Ω	0Ω	4.7KΩ		
V 8	12AU7	†4.5KΩ	♯1 Meg.	0Ω	.1Ω	.1Ω	†5.5KΩ	♯1 Meg.	♯47Ω	0Ω
V 9	6BA6	0Ω	0Ω	0Ω	.1Ω	†2KΩ	†2KΩ	82Ω		
V 10	6AU6	470KΩ	0Ω	0Ω	.1Ω	†2KΩ	†23KΩ	0Ω		
V 11	6AL5	200KΩ	100KΩ	.1Ω	2Ω	0Ω	0Ω	100KΩ		
V 12	6AT6	0Ω	0Ω	0Ω	.1Ω	Inf.	100KΩ	0Ω		
V 13	6SN7GT	♯1 Meg.	†15KΩ	0Ω	4 Meg.	†350Ω	7KΩ	.1Ω	0Ω	
V 14	6SN7GT	♯2 Meg.	♦2.6Meg ♦1.4Meg	♯0Ω	♯2.2Meg	†2KΩ	♯5.5KΩ ♯500Ω	.1Ω	0Ω	
V 15	6SN7GT	♯850KΩ	♦150KΩ	♯300KΩ	♯200KΩ	♦140KΩ	♯0Ω	.1Ω	0Ω	
V 16	6BG6G	Inf.	.1Ω	♯82Ω	♯100KΩ	♯1 Meg	Inf.	0Ω	†5KΩ	TOP CAP ♦ 220Ω
V 17	5V4G	Inf.	100KΩ	100KΩ	†60Ω	Inf.	†60Ω	Inf.	100KΩ	
V 18	1B3GT	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	Inf.	TOP CAP ♦ 600Ω
V 19	5U4G	Inf.	4KΩ	Inf.	700Ω	Inf.	700Ω	Inf.	4KΩ	
V 20	6BA6	2.5 Meg	0Ω	0Ω	.1Ω	◓2.5KΩ	◓56KΩ	68Ω		
V21A	12AT7	◓2.5KΩ	10KΩ	4Ω	0Ω	0Ω	◓2.5KΩ	100KΩ	1000Ω	.1Ω
‡ V21B	12AT7	◓2.5KΩ	10KΩ	4Ω	0Ω	0Ω	◓2.5KΩ	100KΩ	1000Ω	.1Ω
V22	6BA6	4 Meg.	0Ω	0Ω	.1Ω	◓2.5KΩ	◓56KΩ	68Ω		
‡ V23	6BA6	.2Ω	0Ω	0Ω	.1Ω	◓3.5KΩ	◓40KΩ	68Ω		
‡ V24	6AL5	Inf.	Inf.	0Ω	2Ω	7KΩ	0Ω	7KΩ		
V25	6AV6	10 Meg.	0Ω	0Ω	.1Ω	0Ω	500KΩ	◓270KΩ		
V26	6AV6	10 Meg.	0Ω	0Ω	.1Ω	0Ω	0Ω	◓270KΩ		
V27	6K6GT	8.2KΩ	.1Ω	◓260Ω	◓1.5KΩ	470KΩ	0Ω	0Ω	560Ω	
V28	6K6GT	◓400KΩ	.1Ω	◓230Ω	◓1.5KΩ	470KΩ	Inf.	0Ω	560Ω	
V29	5Y3GT	Inf.	190KΩ	Inf.	150Ω	Inf.	140Ω	Inf.	190KΩ	
V30	10BP4	†1000Ω	†5KΩ	PIN 10 ♦56KΩ	PIN 11 †380Ω	PIN 12 †1000Ω				

‡ Taken In FM Position.
† Measured From Pin 8 Of V19.
♯ Measured From Pin 6 Of V15.
♦ Measured From Pin 8 Of V17.
◓ Measured From Pin 8 Of V29.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltage measured at 1,000 ohms.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. Front panels controls set at minimum.
6. Where readings may vary according to the setting of the service controls, both minimum and maximum readings are given.



RADIO CHASSIS - TOP VIEW

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: TRUETONE PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	NOTES
V1	RF Amp.	6BH6	6BH6	7CM	
V2	Mixer	6AG5	6AG5	7BD	
V3	Oscillator	6C4	6C4	6BG	
V4	1st Video IF Amp	6AG5	6AG5	7BD	
V5	2nd Video IF Amp	6AG5	6AG5	7BD	
V6	3rd Video IF Amp	6AG5	6AG5	7BD	
V7	Video Det.-Sync. Clamper	6AL5	6AL5	6BT	
V8	Video Amp.	12AU7	12AU7	9A	
V9	1st Sound IF Amp	6BA6	6BA6	7BK	
V10	Limiter	6AU6	6AU6	7BK	
V11	Disc.	6AL5	6AL5	6BT	
V12	Bias Clamper	6AT6	6AT6	7BT	
V13	Sync. Amp.-Sync. Sep.	6SN7GT	6SN7GT	8BD	
V14	Vert. Osc. and Disch.-Vert. Output.	6SN7GT	6SN7GT	8BD	
V15	Hor. AFC-Hor. Osc.	6SN7GT	6SN7GT	8BD	
V16	Hor. Output	6BG6G	6BG6G	5BT	
V17	Damper	5V4G	5V4G	5L	
V18	HV Rectifier	1B3GT	1B3GT	3C	
V19	LV Rectifier	5U4G	5U4G	5T	
V20	RF Amp.	6BA6	6BA6	7BK	Model D-1994 only.
V21	Converter	12AT7	12AT7	9A	" " "
V22	1st IF Amp.	6BA6	6BA6	7BK	" " "
V23	2nd FM IF Amp.	6BA6	6BA6	7BK	" " "
V24	Ratio Det.	6AL5	6AL5	6BT	" " "
V25	DET.-AVC-AF Amp.	6AV6	6AV6	7BT	" " "
V26	Phase Inverter	6AV6	6AV6	7BT	" " "
V27	Power Output	6K6GT	6K6GT	7S	
V28	Power Output	6K6GT	6K6GT	7S	Model D-1994 only.
V29	Rectifier	5Y3GT	5Y3GT	5T	" " "
V30	Picture Tube	10BP4	10BP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	40	450	45X367	AFH8J2H	UP7BJ920		TVL-69	◓ Filter
B	10	350						▲ Vert. Output Plate Dec.
C2A	40	450	45X370	AFH8J8D26B	UP9CJ887		TVL-57	◓ Filter
B	40	150						■ Filter
C	130	50						▲ Vert. Output Cath. Byp.
C3A	80	450	45X369	AFH162J	UP9BJ857		TVL-47	◓ Filter
B	10	450						▲ Vert. Osc. Plate Dec.
C4A	250	10	45X368	AF50R200S	UP7BJ808		TVL-66	◓ Hor. Cent. Cont. Byp.
B	1000	6						▲ Vert. Cent. Cont. Byp.
C5A	30	400	45X371	AFH2J6I6G	UP8CJ898		TVL-56	■ Filter
B	30	300						▲ Filter
C	10	450						◓ Decoupling
C6A	40	450	45X374	AFH88J8A	UP9CJ1100		TVL-54	◓ Filter
B	40	450						■ Filter
C	40	25						▲ Output Cath. Bypass
C7	5	100	47X361	PRS150/4	BR415		UT-41	Stabilizing Cap.
C8	24	300	45X372	PRS350/24	BR3045		UT-203	Output Decoupling ♦
C9	500		47X496	1468-0005	5W5T5	GP2K-500	1FM-35	Ant. Coupling
C10	500		47X496	1468-0005	5W5T5	GP2K-500	1FM-35	" "
C11	680		47X554			GP2K-750		RF Coupling
C12	680		47X554			GP2K-750		RF Cathode Bypass
C13	680		47X554			GP2K-750		Bias Filter
C14	680		47X554			GP2K-750		RF Screen Bypass
C15	680		47X554			GP2K-750		RF Bypass
C16	50		47X517			GP1K-50		RF Coupling
C17	.68							" "
C18	.47							" "
C19	1.5					NP0K-1.5		" "
C20	25		47X487			GP1K-25		" "
C21	5000		47X507					Mixer Screen Bypass
C22	1500		47X545			GP2L-001		Mixer Plate Dec.
C23	68	500						Fixed Trimmer
C24	1.5					NP0K-1.5		Osc. Coupling
C25	680		47X554					Osc. Feedback
C26	3		47X556			NP0K-3		" "
C27	680		47X554			GP2K-750		Osc. Fil. Bypass
C28	680		47X554			GP2K-750		RF Bypass
C29	270	1000	47X534	1468-00025	5W5T25	GP2K-250	1FM-325	IF Coupling
C30	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	Bias Filter
C31	.25	400	D65254	P488-25	GT4P25		TC-2	" "
C32	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	1st V. IF Decoupling
C33	270	500	47X534	1468-00025	5W5T25	GP2K-250	1FM-325	IF Coupling
C34	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	Bias Filter
C35	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	2nd V. IF Decoupling
C36	51			1469-00005	5R5Q5	NP0M-50	MS-45	Fixed Trimmer
C37	270	500	47X534	1468-00025	5W5T25	GP2K-250	1FM-325	IF Coupling
C38	75			1469-000075		NP0M-75		Fixed Trimmer
C39	100		47X546	1468-0001	5W5T1	GP1K-100	1FM-31	3rd V. IF Cath. Byp.
C40	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	3rd V. IF Decoupling
C41	270	500	47X534	1468-00025	5W5T25	GP2K-250	1FM-325	IF Coupling
C42	10	500	47X542	1468-00001	5W5Q1	GP1K-10	MS-41	V. Diode Filter
C43	.05	400	D67503	P488-05	GT4S5		TM-15	Video Coupling
C44	.05	400	D67503	P488-05	GT4S5		TM-15	" "
C45	.25	400	D65254	P488-25	GT4P25		TC-2	Pic. Tube Cath. Dec.
C46	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Cath. Bypass
C47	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	1st S. IF Decoupling
C48	.01	400	D67103	P488-01	GT4S1	GP2-335-01	TM-11	Limiter Grid Filter
C49	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	Limiter Screen Byp.
C50	1500		47X545	1467-0015	1W5D15	GP2L-0015	1FM-215	Limiter Plate Dec.
C51	270	1000	47X534	1468-00025	5W5T25	GP2K-250	1FM-325	RF Bypass
C52	.05	400	D67503	P488-05	GT4S5		TM-15	Video Coupling
C53	100	500	47X544	1468-0001	5W5T1	GP1K-100	1FM-31	Sync. Coupling
C54	390	1000	47X535	1469-0004	5R5T4		MS-34	Sync. Amp. Cath. Byp.

PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (CONT.)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA TRUETONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C55	.002	600	[illegible]	P656-002	JT6D2	GP2M-002	TM-22	Integrator Net.
C56	.002	600	D6[illegible]	P688-002	JT6D2	GP2M-002	TM-22	" "
C57	.005	400	D6[illegible]	P688-005	GT6D5	GP2M-005	TM-25	" "
C58	.005	400	D6[illegible]	P688-005	GT6D5	GP2M-005	TM-25	" "
C59	4700	500	47X543	1467-005	1D5D5	GP2M-005	1FM-25	Vert. Osc. Grid Cap.
C60	.1	1000	47X547	1084-1	GT6P1		TM-1	Vert. Discharge
C61	.15	400	D6[illegible]	P488-25	GT4P25		TC-2	Vert. Sweep Coupling
C62	120	500	47X482					Hor. Sync. Coupling
C63	120	500	47X482					Hor. Sync. Coupling
C64	.002	600	F656[illegible]	P688-002	JT6D2	GP2M-002	TM-22	Hor. Sync. Coupling
C65	.15	400	D6[illegible]	P488-25	GT4P25		TC-2	AFC Filter
C66	.15	400	D6[illegible]	P488-02	GT4S2		TM-12	" "
C67	.15	400	D6[illegible]	P488-05	GT4S5		TM-15	" "
C68	150	1000	47X[illegible]					AFC Plate Bypass
C69	150	1000	47X[illegible]					Hor. Osc. Grid Cap.
C70	1500	1000	47X[illegible]					Hor. Discharge
C71	1500	1000	47X[illegible]	1469-0004	SR5T4		MS-34	Hor. Sweep Coupling
C72	.1	400	46X410	1468-00005	5W5Q5	GP1K-50	1FM-45	Voltage Divider
C73	.15	400	D6[illegible]	P488-25	GT4P25		TC-2	Hor. Output Cath. Byp.
C74	.1	400	46X[illegible]		GT6S5		TM-15	Hor. Output Screen Byp.
C75	.005	1000	46X439	1084-1				Damper Filter
C76	.1	1000	46X439					" "
C77	.1	1000	47X583					AFC Feedback
C78	.1	10000	47X584			410-500		HV Filter
C79	.01	400	46X410	P488-01	GT4S1		TM-11	Line Filter
C80	.01	400	46X410	P488-01	GT4S1		TM-11	" "
C81	1000		47X[illegible]	1468-001	1W5D1	GP2L-001	1FM-21	Voltage Divider †
C82	.1		47X472	1468-00005	5W5Q5	GP1K-50	1FM-45	Ant. Coupling
C83	.1		47X550	1469-0001	5R5T1	M750L-100	MS-31	Fixed Trimmer
C84	.1	150	47X553	1468-00005	5W5V5	NP0K-5	MS-55	RF Coupling
C85	.15		47X[illegible]			GP1K-15	MS-415	Fixed Trimmer
C86	500		47X436	1468-005	5W5T5	GP2K-500	1FM-35	RF Coupling
C87	500		47X496	1468-005	5W5T5	GP2K-500	1FM-35	AVC Filter
C88	500		47X496	1468-0005	5W5T5	GP2K-500	1FM-35	RF Cath. Bypass
C89	1000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	RF Screen Bypass
C90	1000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	RF Plate Decoupling
C91	150		47X552	1469-0001	5R5T1	N750L-100	MS-31	Fixed Trimmer
C92	150		47X552			GP1K-15	MS-415	" "
C93	150		47X[illegible]	1468-0001	5W5T1	GP1K-100	1FM-31	RF Coupling
C94	500		47X436	1468-005	5W5T5	GP2K-500	1FM-35	" "
C95	500		47X[illegible]	1468-00005	5W5Q5	GP1K-75	1FM-475	" "
C96	47		47X459	1469-0005	5R5Q5	NP0M-50	MS-45	Fixed Trimmer
C97			47X549	1468-000005	5R5V5	NP0K-5	MS-55	" "
C98			47X516					" "
C99	4		47X439	1468-00005	5W5Q5	GP1K-50	1FM-45	Osc. Grid Cap.
C100	.001		47X507	1467-005	1D5D5	GP2M-005	1FM-25	Mixer Cath. Bypass
C101	5000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	Mixer Decoupling
C102	.4	600	F[illegible]403	P688-04	GT6S4		TM-14	Mixer Decoupling
C103	.005		47X496	1468-0005	5W5T5	GP2K-500	1FM-35	Filament Bypass
C104	100		47X[illegible]	1468-0001	5W5T1	GP1K-100	1FM-31	IF Coupling
C105	.25	200	F[illegible]25	P285-05	GT2S5		TM-15	AVC Filter
C106	.005		47X436	1468-0005	5W5T5	GP2K-500	1FM-35	1st IF Cath. Bypass
C107	.02	600	F[illegible]603	P688-02	GT6S2		TM-12	1st IF Screen Bypass
C108	.02	600	F[illegible]603	P688-02	GT6S2		TM-12	1st IF Plate Dec.
C109	.01		47X[illegible]	1468-000075	5W5Q7	JP1K-75	1FM-475	Diode RF Filter
C110	50		47X112	1468-00005	5W5Q5	GP1K-50	1FM-45	" " "
B	50			1468-00005	5W5Q5	GP1K-50	1FM-45	" " "
C111	5000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	2nd IF Cath. Bypass
C112	5000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	2nd IF Screen Bypass
C113	5000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	2nd IF Plate Dec.
C114	25		47X[illegible]	1468-000075	5W5Q7	GP1K-75	1FM-475	Diode Load Cap.
C115	25		47X[illegible]	1468-000075	5W5Q7	GP1K-75	1FM-475	" "
C116	2700	500	47X492	1467-0025	1W5D25	GP2M-0025	1FM-225	De-emphasis
C117	.1	600	F66103	P696-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C118	.01	120	46X538	P488-01	GT2S1	GP2-335-01	TM-11	Audio Coupling
C119	5000		47X507	1467-005	1D5D5	GP2M-005	1FM-25	AVC Filter
C120	68		47X501	1468-000075	5W5Q7	GP1K-75	1FM-475	Tone Comp.
C121	20	500	47X516	1468-00005	5W5Q5	NP0K-20	MS-42	RF Bypass
C122	.02	200	F66[illegible]03	P488-02	GT2S2		TM-12	Tone Comp.
C123	.006	600	F66[illegible]03	P688-02	GT6D6		TM-28	" "
C124	.01	600	F66[illegible]03	P683-01	GT6S1	GP2-335-01	TM-11	Audio Coupling
C125	220	500	47X488	1468-00025	5W5T25	GP2K-250	1FM-325	AF Plate Bypass
C126	.02	600	F66[illegible]03	P688-02	GT6S2		TM-12	Audio Coupling
C127	.02	600	F66[illegible]03	P688-005	GT6D5	GP2M-005	TM-28	" "
C128	.02	600	F66[illegible]03	P688-02	GT6S2		TM-28	" "
C129	.001	600	F66102	P688-001	GT6D1	GP2L-001	TM-21	Output Plate Bypass
C130	.001	600	F66[illegible]2	P688-001	GT6D1	GP2L-001	TM-21	" "
C131	.0065	400	D6[illegible]2	P668-002	GT6S3	GP2M-0025	TM-23	Audio Coupling ♦
C132	.01	400	DC7103	P496-01	GT4S1	GP2-335-01	TM-11	" " ♦
C133	.025	400	D64252	P684-0022	GT6D2	GP2M-0025	TM-22	AF Plate Bypass ♦
C134	.01	400	DC7103	P496-01	GT4S1	GP2-335-01	TM-11	Audio Coupling ♦
C135	.005	600	F65602	P688-05	GT6D5	GP2M-005	TM-25	Output Plate Bypass ♦

* Some models use 20MMF in this application.
† Not used in all models.
♦ Used only in models D-1991,D-1991B D-1993 and D-1993B.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	500KΩ	‡	36X380	Q13-133X	AT-78	Volume control, tapped ⑤ 100K
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A Per Instructions
C	Switch		Not Req.	76-1	SW-A	" " "
R1A	1 Meg.	‡	36X378			Volume control and switch *
R2A	3 Meg.	‡	40X285	Q13-140	AM-67-Z	Tone control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R2A Per Instructions
R3A	50KΩ	‡	78X2			Horiz. hold control (Dual Concentric)
B	1 Meg.	‡				Vert. Hold control
R4A	500KΩ	‡	78X1			Brightness control (Dual Concentric)
B	10KΩ	‡				Contrast control
R5	500KΩ	‡	77X4	Q11-114	M-19-8	Vert. linearity control
R6	2.5MEG	‡	77X3	Q11-239		Height control
R7	20Ω	2	77X6	W-20X10	58-20CT	Vert. centering control,tapped ⑤ 10Ω Wire Wound
R8	2Ω	2	77X5	W-20	58-20	Horiz. centering control, wire wound
R9	2250Ω	4	77X1		58-250	Focus control

* Used only in Models D-1991 and D-1993

RESISTORS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	IDENTIFICATION CODES ALL RESISTORS ARE ± 10% UNLESS OTHERWISE STATED.
R10	1000Ω	‡	B65102		Ant. Shunt 20%
R11	1000Ω	‡	B65102		Ant. Shunt 20%
R12	22KΩ	‡	B65223		RF Grid 20%
R13	33KΩ	‡	B65333		RF Screen 20%
R14	10KΩ	1	C65103		RF Plate
R15	100Ω	‡	B65101		RF Cathode 20%
R16	4700Ω	‡	B65472		Mixer Coil Shunt 20%
R17	1 Meg.	‡	B65105		Mixer Grid 20%
R18	82KΩ	‡	B65823		Mixer Screen 20%
R19	6800Ω	1	C65682		Osc. Plate 20%
R20	22KΩ	‡	B65223		Osc. Grid 20%
R21	470Ω	‡	B65471		Osc. Cathode 20%
R22	1000Ω	‡	B65102		Mixer Plate Decoupling 20%
R23	15KΩ	‡	32B3153		1st Video IF Grid 5%
R24	39Ω	‡	32B4390		1st Video IF Cathode
R25	1000Ω	‡	32B5102		1st Video IF Decoupling
R26	6.8 Meg.	‡	32B4685	BTS-6.8 Meg.	Voltage Divider
R27	82KΩ	‡	32B4823	BTS-82K	Voltage Divider
R28	10KΩ	‡	32B4103	BTS-10K	Bias Network
R29	12KΩ	‡	32B4123	BTS-12K	Bias Network
R30	1000Ω	‡	32B5102	BTS-1000	Bias Network
R31	5600Ω	‡	32B3562		2nd Video IF Grid 5%
R32	39Ω	‡	32B4390		2nd Video IF Cathode
R33	1000Ω	‡	32B5102		2nd Video IF Decoupling
R34	1000Ω	‡	32B5102	BTS-1000	Voltage Divider
R35	5600Ω	‡	32B3562		3rd Video IF Grid 5%
R36	150Ω	‡	32B4151		3rd Video IF Cathode
R37	3300Ω	‡	32B3682		3rd Video IF Screen 20%
R38	1000Ω	‡	32B5102		3rd Video IF Decoupling
R39	47000Ω	‡	32B4472	BTS-4700-5%	Video Det. Diode Load 5%
R40	3300Ω	‡	32B3332	BTS-3300-5%	Video Det. Diode Load 5%
R41	1 Meg.	‡	32B5105	BTS-1 Meg.	Video Amp. Grid 20%
R42	3300Ω	‡	32B4332	BTS-3300	Video Amp. Plate
R43	1 Meg.	‡	32B5105	BTS-1 Meg.	Video Output Grid
R44	47Ω	1	32B5470	BW-½-47	Video Output Cathode 20%
R45	3300Ω	1	32B4332	BTA-3300	Video Output Plate
R46	1000Ω	‡	32B5102	BTS-1000	Video Output Plate
R47	100KΩ	‡	32B5104	BTS-100K	Voltage Divider
R48	82Ω	‡	32B4820		1st Sound IF Cathode
R49	12000Ω	‡	32B4122		1st Sound IF Decoupling
R50	470KΩ	‡	32B5474		2nd Sound IF Grid 20%
R51	22KΩ	‡	32B5223		2nd Sound IF Screen Decoupling 20%
R52	1000Ω	‡	32B5102		2nd Sound IF Plate Decoupling
R53	100KΩ	‡	32B3104	BTS-100K-5%	Disc. Diode Load 5%
R54	100KΩ	‡	32B3104	BTS-100K-5%	De-emphasis 5%
R55	5.1Ω		43X239	BW-½-4.7	Disc. Filament (Wire Wound)
R56	10 Meg.	‡	32B5106	BTS-10 Meg.	AF Grid See Note
R57	330KΩ	‡	32B4334	BTS-330K	AF Plate See Note
R58	470KΩ	‡	32B5474	BTS-470K	Output Grid See Note
R59	1000Ω	1	32C5102	BW-1-1000	Filter See Note
R60	15KΩ	1	32C5153	BTA-15K	Sync. Amp. Plate
R61	1 Meg.	‡	32B5105	BTS-1 Meg.	Sync. Amp. Grid
R62	3.9 Meg.	‡	32B4395	BTS-3.9 Meg.	Sync. Sep. Grid
R63	6800Ω	‡	32B3682	BTS-6800-5%	Sync. Sep. Cathode 5%
R64	22KΩ	‡	32B4223	BTS-22K	Integrator 20%
R65	8200Ω	‡	32B4822	BTS-8200	"
R66	8200Ω	‡	32B4822	BTS-8200	"
R67	1.5 Meg.	‡	32B4155	BTS-1.5 Meg.	Voltage Divider
R68	6.8 Meg.	‡	32B5685	BTS-6.8 Meg.	"
R69	100KΩ	‡	32B4104	BTS-100K	" "
R70	1 Meg.	‡	32B3105	BTS-1 Meg-5%	Vert. Osc. Grid 5%
R71	560Ω	‡	32B4561	BTS-560	Vert. Output Cathode
R72	2.2 Meg.	‡	32B5225	BTS-2.2 Meg.	Vert. Output Grid
R73	3900Ω	‡	32B4392	BTS-3900	Vert. Peaking
R74	1000Ω	‡	32B5102	BTS-1000	Filter
R75	560KΩ	‡	32B3564	BTS-560K-5%	Horiz. AFC Grid 20%
R76	180KΩ	‡	32B4184	BTS-180K	Horiz. AFC Cathode
R77	100KΩ	1	32C3104	BTA-100K-5%	" "
R78	100KΩ	‡	31B1104	BTS-100K	Horiz. Osc. Grid
R79	82000Ω	‡	32B4822	BTS-8200	Horiz. AFC Filter Network
R80	150KΩ	‡	32B4154	BTS-150K	" " "
R81	30KΩ	‡	34A1		Voltage Divider Temp. Comp.
R82	120KΩ	‡	32B4124	BTS-120K	" " "
R83	270KΩ	1	32C4274	BTA-270K	" " "
R84	10KΩ	‡	32B4103	BTS-10K	Horiz. Osc. Transformer Shunt
R85	120KΩ	1	32C4124	BTA-120K	Horiz. Osc. Plate
R86	47Ω	‡	32B5470		Parasitic Supp. 20%
R87	1 Meg.	‡	32B5105	BTS-1 Meg.	Horiz. Output Grid
R88	150Ω	‡	32B4820	BW-1-82	Horiz. Output Cathode
R89	4700Ω	1	32C4472	BTA-4700	Horiz. Output Screen
R90	10KΩ	‡	32B4103	BTS-10K	Filter
R91	560KΩ	‡	32B4564	BTS-560K	Feedback
R92	56KΩ	‡	32B4563	BTS-56K	Filter
R93	3.3Ω	‡	43X238		HV Filament (Wire Wound)
R94	1 Meg.	1	32C5105		HV Filter
R95	680Ω	1	32C5681	BTA-680	Focus Coil Shunt
R96	680Ω	1	32C5681	BTA-680	" " "
R97A	7000Ω	20 }		DG-700	Filter (Wire Wound)
B	510Ω	20 }	45X244	DG-500	Bias Network (Wire Wound)
R98A	11250Ω	20 }			Filter Wire Wound See Note
B	610Ω	20 }	43X234		Bias Network (Wire Wound) See Note
R98A	28300Ω	1 }			Bleeder (Wire Wound)
B	300Ω	.8 }	43X243	BW-1-33	Voltage Divider (Wire Wound)
C	85Ω	2 }		BW-2-82	Bias Network (Wire Wound)
R98A	82000Ω	5 }		AB-8000	Bleeder (Wire Wound) See Note
B	35Ω	.8 }	43X235	BW-1-33	Voltage Divider (Wire Wound) See Note
C	100Ω	2 }		BW-2-100	Bias Network (Wire Wound) See Note
R99	39Ω	1	32C4390	BW-1-39	Bias Network
R100	1 Meg.	‡	B65105	BTS-1 Meg.	RF Grid 20%
R101	68Ω	‡	B68680	BW-½-68	RF Cathode
R102	56KΩ	‡	B64563	BTS-56K	RF Screen
R103	10000Ω	‡	B64102	BTS-1000	RF Plate Decoupling
R104	100KΩ	‡	B65104	BTS-100K	Conv. Grid
R105	1000Ω	‡	B64102	BTS-1000	Conv. Plate Decoupling
R106	1000Ω	‡	B64102	BTS-1000	Conv. Cathode
R107	33000Ω	‡	B64332	BTS-3300	FM RF Coil Shunt
R108	10KΩ	‡	B64103	BTS-10K	Osc. Grid

RESISTORS (CONT.)

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA TRUETONE PART No.	IRC PART No.	IDENTIFICATION CODES
R109	... Meg.	‡	B65225	BTS-2.2 Meg.	1st IF Grid 20%
R110	68Ω	‡	B68680	BW-½-68	1st IF Cathode
R111	56KΩ	‡	B64563	BTS-56K	1st IF Screen
R112	91KΩ	‡	B64913	BTS-100K-5%	1st IF Transformer Shunt 5%
R113	1000Ω	‡	B64102	BTS-1000	1st IF Plate Decoupling
R114	1 Meg.	‡	B65105	BTS-1 Meg.	AVC Network 20%
R115	470KΩ	‡	B65474	BTS-470K	Diode Load 20%
R116	47KΩ	‡	B65473	BTS-47K	Diode Filter 20%
R117	68Ω	‡	B68680	BW-½-68	2nd FM IF Cathode
R118	39KΩ	1	C64393	BTA-39K	2nd FM IF Screen
R119	2200Ω	‡	B65222	BTS-2200	2nd FM IF Plate Decoupling 20%
R120	27KΩ	‡	B64273	BTS-27K	De-emphasis
R121	6800Ω	‡	B63682	BTS-6800-5%	Ratio Det. Diode Load 5%
R122	6800Ω	‡	B63682	BTS-6800-5%	Ratio Det. Diode Load 5%
R123	3.6Ω	‡	43X233	BW-½-3.9	Disc. Filament (Wire Wound)
R124	1 Meg.	‡	B65105	BTS-1 Meg.	AVC Network 20%
R125	470KΩ	‡	B65474	BTS-470K	Tone Compensation 20%
R126	15KΩ	‡	B65153	BTS-15K	" " 20%
R127	10 Meg.	‡	B65106	BTS-10 Meg.	AF Grid 20%
R128	270KΩ	‡	B65274	BTS-270K	AF Plate 20%
R129	10 Meg.	‡	B65106	BTS-10 Meg.	Phase Inv. Grid 20%
R130	270KΩ	‡	B65274	BTS-270K	Phase Inv. Plate 20%
R131	470KΩ	‡	B65474	BTS-470K	Output Grid 20%
R132	82000Ω	‡	B64822	BTS-82000	Output Grid
R133	470KΩ	‡	B65474	BTS-470K	Output Grid 20%
R134	560Ω	2	D63561	ET-2-560	Output Cathode
R135	1400Ω	5	43X242	AB-1450	Filter (Wire Wound)
R136	3.3 Meg.	1	33C3335	BTA-3.3Meg-5%	Voltage Divider

Note - Used only in models D-1991, D-1991B, D-1993, and D-1993B.

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA TRUETONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.
T1	117VAC ⑥ 1.6A	730VCT .25ADC ⑥ SEC. 4 8.3VAC ⑥ 5.5A	5VAC ⑥ 2A SEC. 5 6.3VAC ⑥ .6A	5VAC ⑥ 2A	53X297	P-8153	TP-355	P-3063
T2	117VAC ⑥ .78A	760VCT .105ADC	⑥ 2A	6.3VAC ⑥ 3.1A	53X2864†	P-6014 ♦	PH-120B	P-2954 ♦

♦ Drill new mounting holes.
†† Used only in model D-1994

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	TRUETONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	NOTES
T3	150Ω Tap ⑥ 41Ω		8A1984				Hor.Osc.Transformer
T4	165Ω	13.1KΩ	54X4	A-8121	TB0-1	A-4000	Vert.Block Osc. Trans
T5	430Ω Tap ⑥ 18Ω	SEC. 1 10.6Ω Tap ⑥ .6Ω SEC. 2 .02Ω	53X296	A-8117	TFB-2		Hor.Output Trans.
T6	590Ω	7Ω	51X140	A-8115	TS0-1	A-3036	Vert. Output Trans.
T7A	14Ω		9A1987	DY-1			Hor. Deflection Coil
B	63Ω		"	"			Vert.Deflection Coil
T8	364Ω		9A1974	FC-10			Focus Coil

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
T9A	10KΩ CT	3.2Ω	480Ω CT	.5Ω	51X142 ††	A-3823	RO-110	A-2936	†† Used only in Model D-1994
B					51X139††				†† Used only in Models D-1991 and D-1993

SPEAKER

ITEM No.	RATINGS	REPLACEMENT DATA TRUETONE PART No.	JENSEN PART No.	QUAM PART No.	INSTALLATION NOTES
SP1	FIELD PM V.C. 1.F. 3.2Ω	12A490	ST-102 ‡ MOD.P12-8	12A6A	‡ Replace output transformer to match 6-8Ω voice coil.
SP2	CONE DIA. 11 1/2" V.C. DIA. 1"				

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D.C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA TRUETONE PART No.	STANCOR PART No.	CHICAGO PART No.	MERIT PART No.	INSTALLATION NOTES
L1	.250A	62Ω	2.2Henries	52X87	C-2326	TR-4200	C-2991	

TRUETONE MODELS D1991, B, D1993, B, D1994

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA TRUETONE PART No.	REPLACEMENT DATA MEISSNER PART No.	NOTES
L2	Ant. Input	0Ω				Part of Tuner
L3	Ant. Input	0Ω				High Band Part of Tuner
L4	Ant. Input	0Ω				High Band Part of Tuner
L5	Fil. Choke	0Ω				Part of Tuner
L6	1st Video IF	0Ω	0Ω	9A2032		
L7	2nd Video IF	.1Ω		9A1980		
L8	3rd Video IF	.1Ω	0Ω	9A1982		
L9	Sound Trap	0Ω	0Ω	9A1985		
L10	4th Video IF	.1Ω		9A1980		
L11	Peaking	3Ω		9A1979		36 Microhenries
L12	Peaking	8Ω		9A1977		180 Microhenries wound on 39KΩ resistor.
L13	Peaking	6Ω		9A1978		120 microhenries wound on 22KΩ resistor.
L14	Peaking	3Ω		9A1979		36 Microhenries
L15	Peaking	6Ω		9A1978		120 Microhenries wound on 22KΩ resistor.
L16	Sound IF	0Ω	0Ω	9A1986		
L17	Disc. Trans.	0Ω	0Ω	9A1983		
L18	Width Control	.2Ω		9A1976		
L19	Hor. Linearity	36Ω		9A1981		
L20	FM Ant.	0Ω		9A2027		
L21	AM Ant.	29Ω	4Ω	9A2026		
L22	RF Choke	2.5Ω		35A5		
L23	AM RF	29Ω	4Ω	9A2025		
L24	FM RF	0Ω		9A2024		
L25	FM Osc.	0Ω		9A2023		
L26	AM Osc.	5Ω		9A2022		
L27	Cathode Chk.	2.5Ω		35A5		Used only in Model D-1994
L28	Fil. Chk.	.5Ω		9A1881		
L29	RF Choke	.4Ω		35A7		
L30	1st FM IF	.2Ω	.2Ω	9A2034		
L31	1st AM IF	18Ω	18Ω	9A2029	16-6678	
L32	2nd FM IF	2Ω	.6Ω	9A2030		
L33	2nd AM IF	19Ω	19Ω	9A1963	16-6678	
L34	Ratio Det. Trans.	2.7Ω	.2Ω	9A1970		
L35	Fil. Choke	0Ω		9A2033		

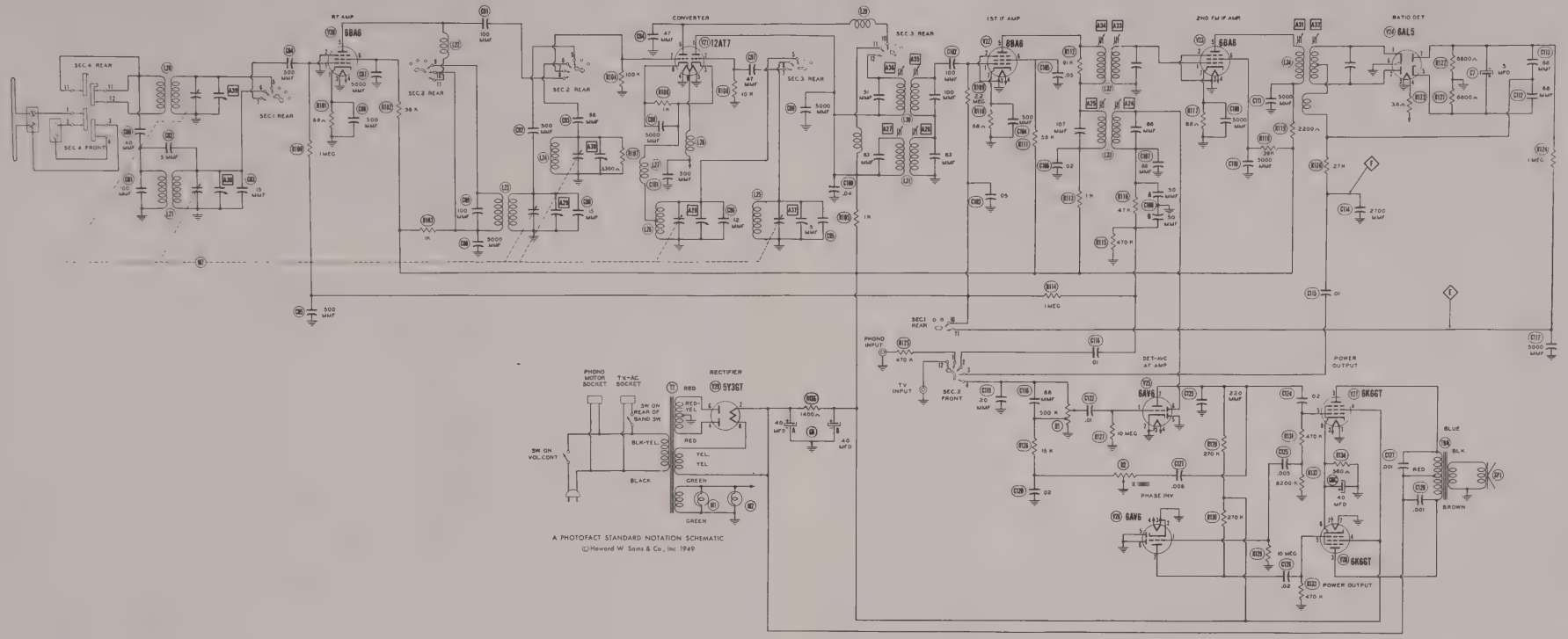
DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA TRUETONE PART No.		NOTES
M1	Bayonet	6-8	.15	Brown	7A103		Type #47
M2	Bayonet	6-8	.15	Brown	7A103		Type #47

MISCELLANEOUS

ITEM No.	PART NAME	TRUETONE PART No.	NOTES
M3	Tuner	S-25A1	Complete
M4	Band Switch	2A386	Includes TV power Switch.
M5	Fuse	16X132	Type AGC 3A
M6	Fuse	16X133	Type AGC .25A
M7	Tuning Cap.	14A207	20-473MMF, 32-215MMF W/T
M8	Ion Trap	2A382	PM
	Safty Glass	17X102	
	Knob	10A719	Radio Tuning
	Knob	10A720	Radio on-off-volume
	Knob	10A721	Radio Tone
	Knob	10A717	Fine Tuning - Models
	Knob	10A714	Brightness and Horizontal Hold
	Knob	10A716	Contrast and Vert. Hold
	Knob	10A715	On-off-volume
	Knob	10A718	Channel Selector

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



A PHOTOFACT STANDARD NOTATION SCHEMATIC
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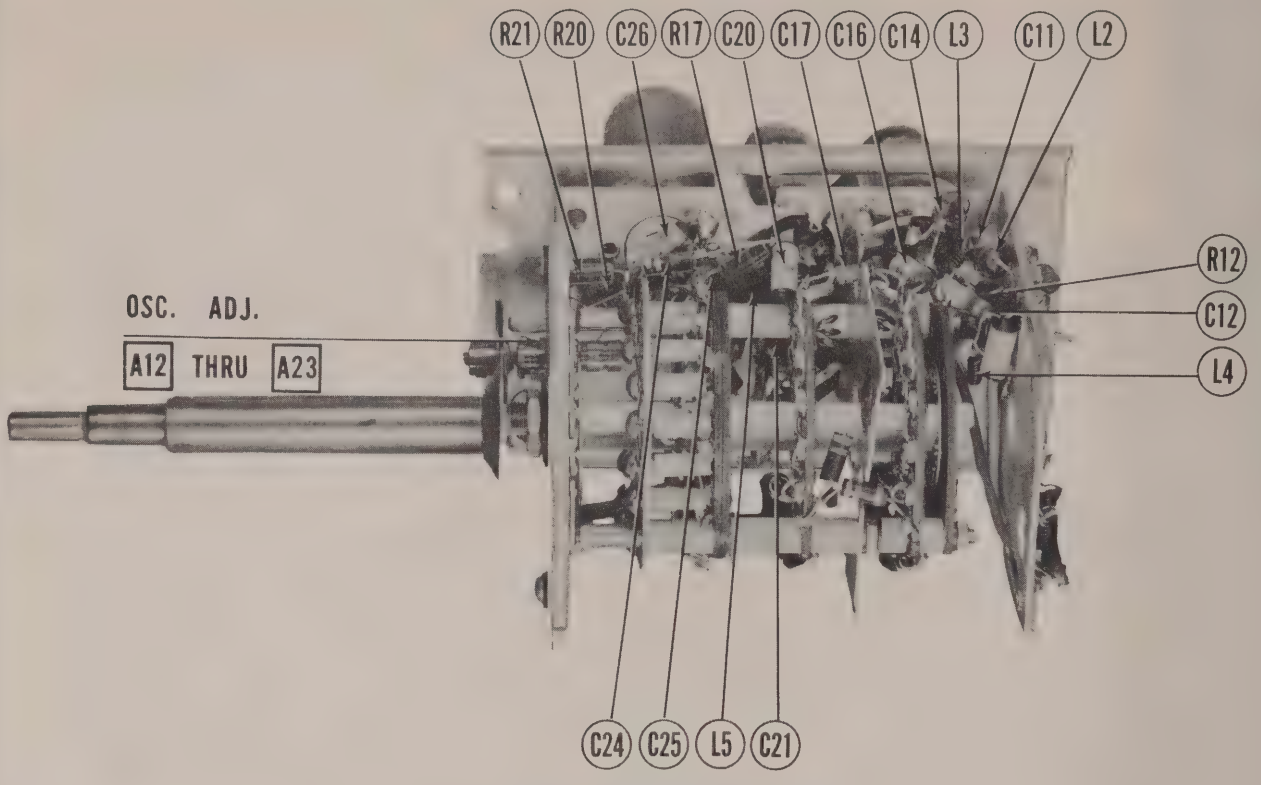
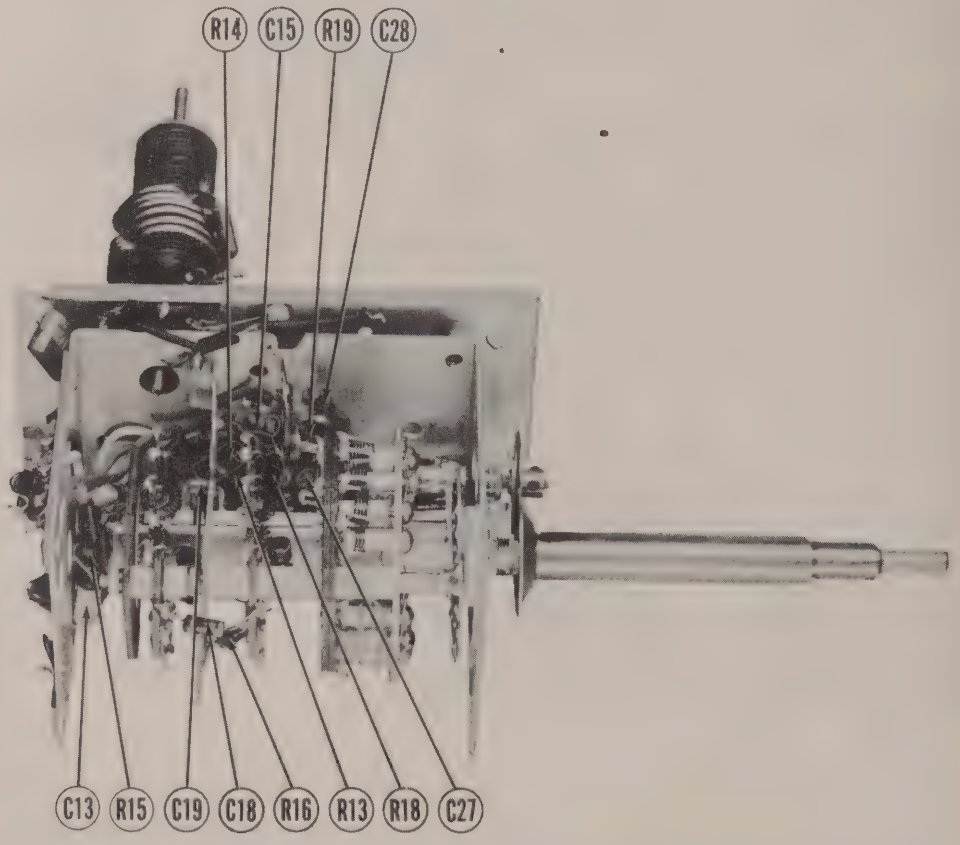
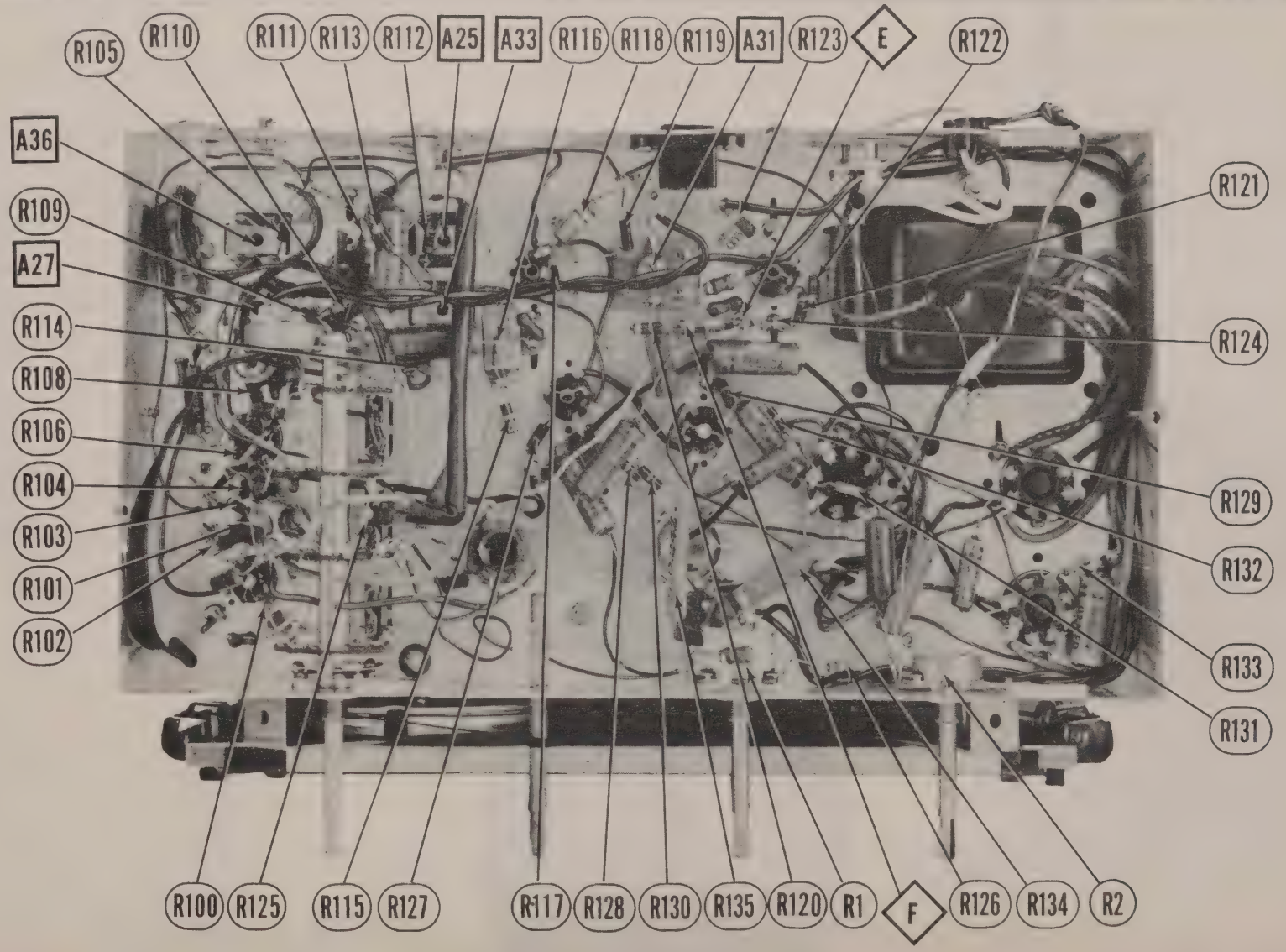


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

CHASSIS TOP VIEW



RADIO CHASSIS-BOTTOM VIEW-RESISTOR AND ALIGNMENT IDENTIFICATION

RADIO CHASSIS-BOTTOM VIEW-CAPACITOR AND INDUCTOR IDENTIFICATION

HORIZONTAL OSC. AND LINEARITY ADJUSTMENTS

HORIZONTAL OSCILLATOR ALIGNMENT CHECK:

Tune in test pattern and turn horizontal hold control to extreme counter-clockwise position. Picture should remain in synchronization. Turn channel switch to another channel and then back to the original channel. Normally, the picture should be out of synchronization. Turn the control clockwise and the picture should slowly begin to synchronize and finally lock-in. This should occur when the control is approximately 90° from the extreme counter-clockwise position. The picture should remain in synchronization for another 90° in the clockwise direction of the control. At the extreme clockwise position the picture should again drop out of synchronization and 3½ to 4½ bars should be seen sloping downward to the right. If the receiver fails to hold synchronization during this check with the hold control at the extreme counter-clockwise position or fails to hold synchronization for at least 60° in the clockwise direction from the point when it drops into "sync". it will be necessary to align the horizontal oscillator circuit as follows:

(A) HORIZONTAL OSCILLATOR ALIGNMENT

Turn horizontal hold control to extreme clockwise position. Tune in test pattern and adjust trimmer B1 until picture is out of sync. and shows 3½ to 4½ bars sloping downward to the right. If the trimmer has insufficient range, set it to its mid-position (one turn from tight) and adjust slug B2 until bars appear.

(B) HORIZONTAL LOCKING ALIGNMENT:

Turn the horizontal hold control to full counter-clockwise position. Switch to another channel and back to the original again.

Slowly turn horizontal hold control clockwise and note the lest number of diagonal bars present just before picture sync. If more than 4½ bars are present just before picture sync. adjust "horizontal lock" trimmer B3 slightly clockwise. If less than 3½ bars are present, adjust B3 slightly counter-clockwise and switch channel selector to another channel and back again. Recount bars present at the "lock-in"point. Repeat this procedure until 3½ to 4½ bars are present.

Repeat Steps (A) and (B) until conditions exist as outlined under "Horizontal Oscillator Alignment Check".

WIDTH, DRIVE & HORIZONTAL LINEARITY ADJUSTMENTS:

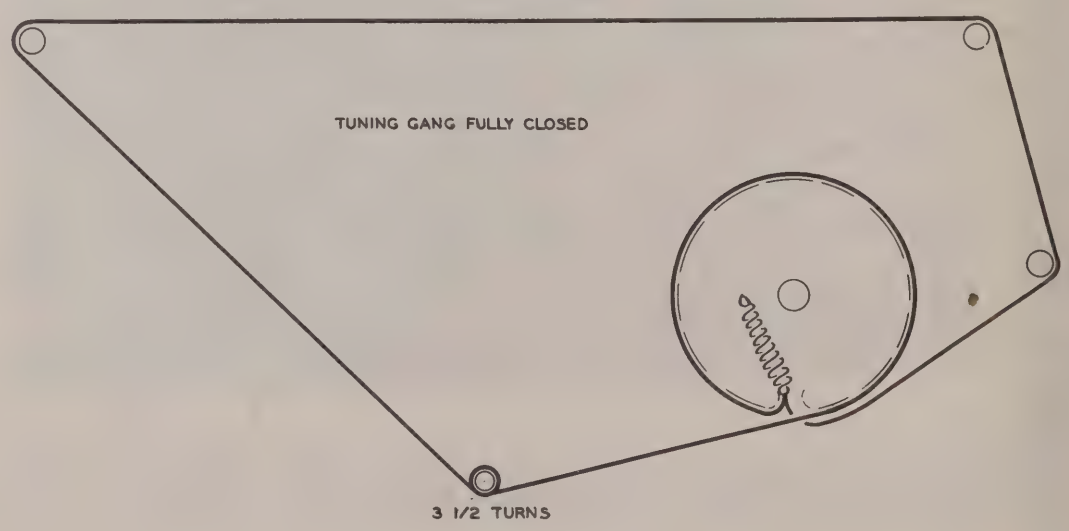
Turn width control B4 to maximum clockwise position. Adjust "horizontal drive" trimmer B5 for maximum brightness and linearity. Adjust horizontal linearity B6 for best linearity in the right half of the picture. Readjust width control until picture fills the mask.

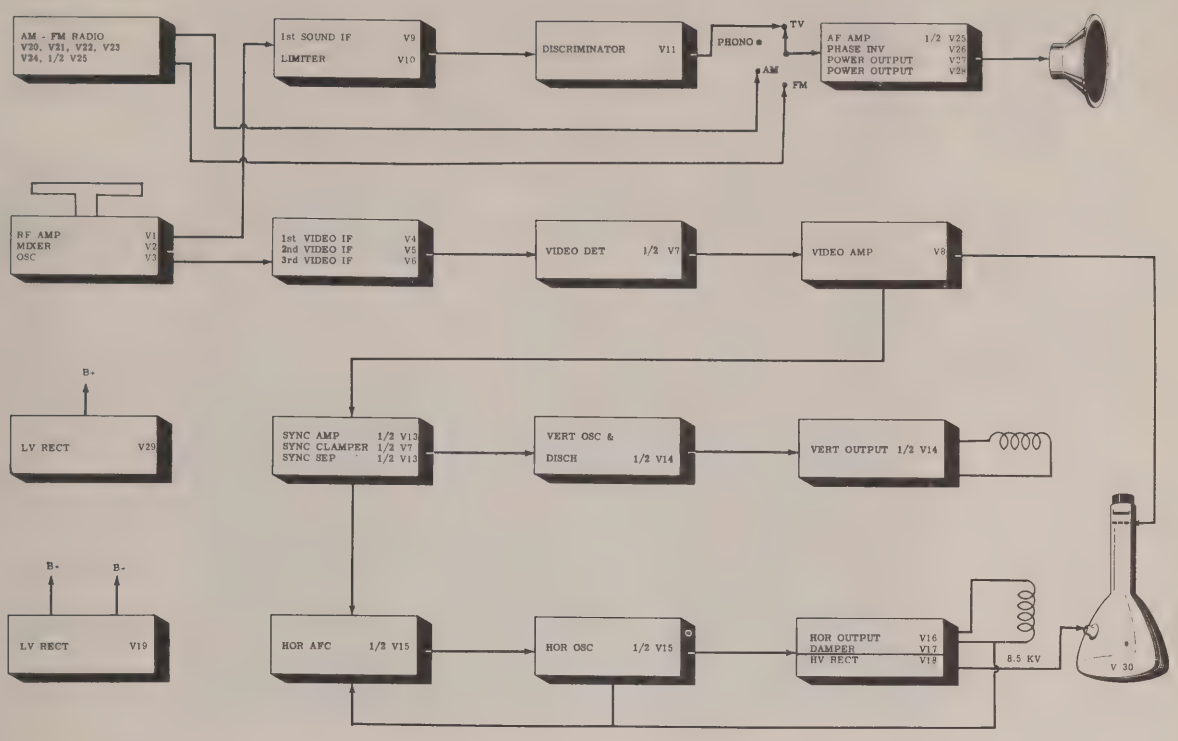
HEIGHT & VERICAL LINEARITY ADJUSTMENTS:

Adjust the height control until picture fills mask vertically. Adjust the vertical linearity control until the test pattern is symmetrical from top to bottom.

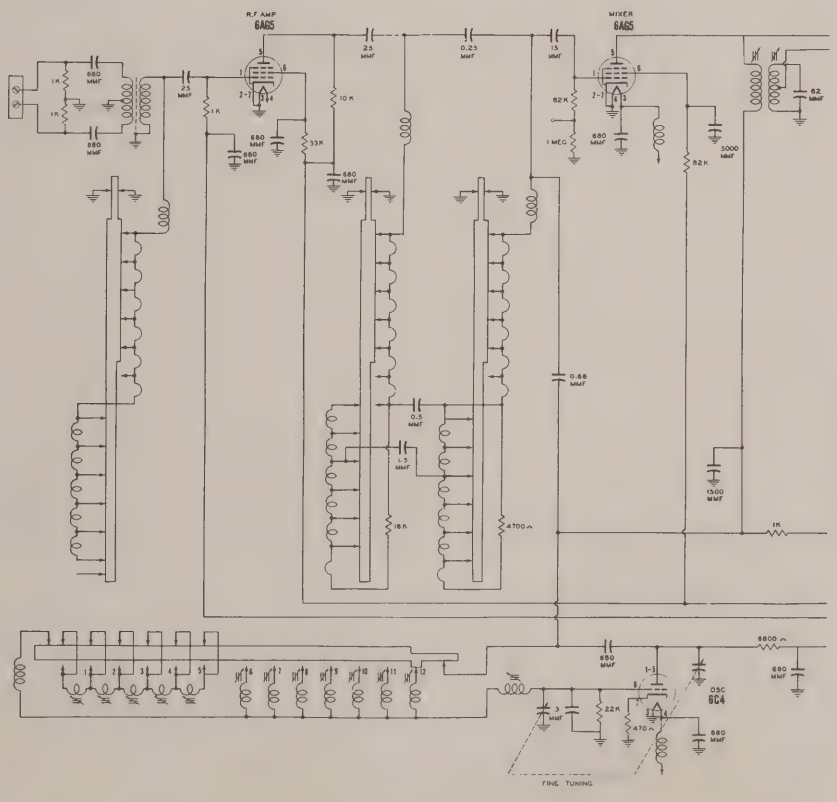
Due to interaction between these two controls it is necessary to repeat the adjustments. Adjust the vertical centering control to align the picture with the mask.

DIAL CORD STRINGING

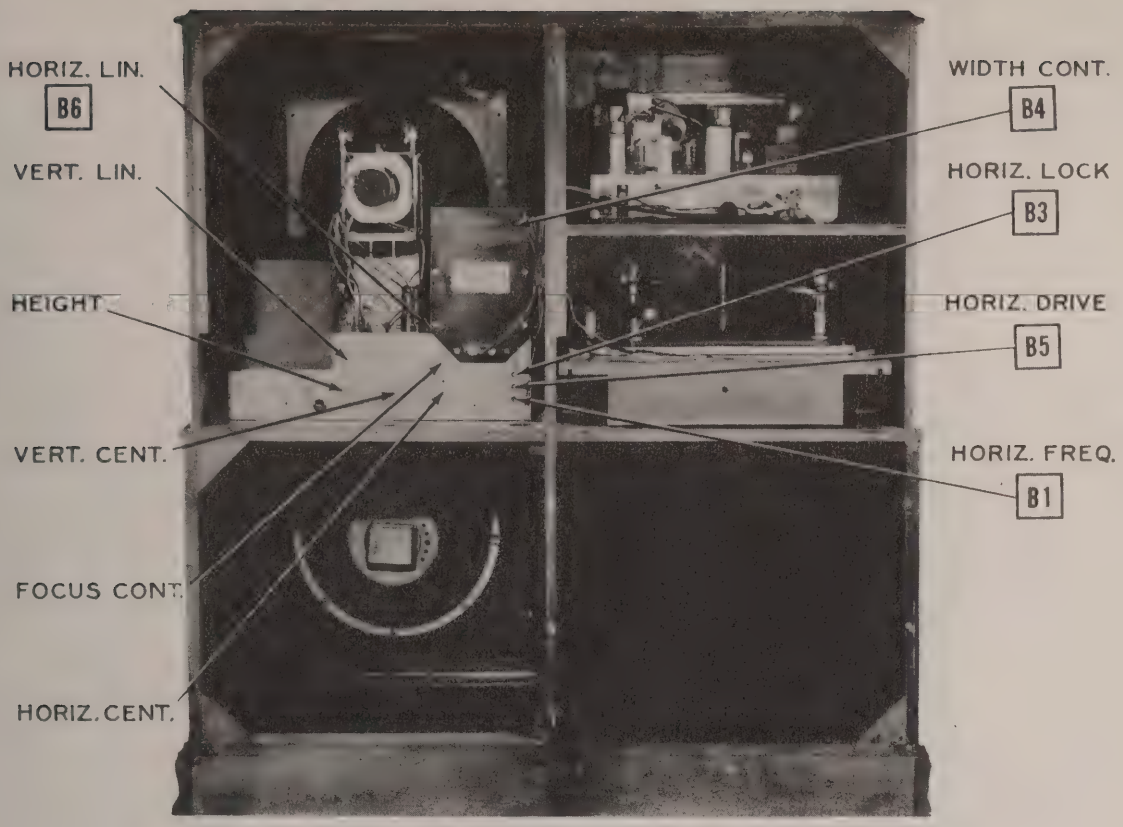




BLOCK DIAGRAM



RF TUNER - MODELS D-1991B, D-1993B



DISASSEMBLY INSTRUCTIONS

1. Remove three push-on type knobs from TV controls.
2. Remove four push-on type knobs from receiver controls.
3. Remove six fasteners holding cover over rear of TV section.
4. Remove 16 screws holding cover over rear of phono section.
5. Disconnect TV antenna plug from left rear of receiver chassis.
6. Disconnect TV audio plug from rear of receiver chassis.
7. Disconnect TV power plug from rear of receiver chassis.
8. Remove five 7/16" hex head bolts holding TV chassis to mounting board. Remove TV chassis.
9. Remove speaker wires at speaker.
10. Remove phono motor power plug from rear of receiver chassis.
11. Remove phono audio plug from rear of receiver chassis.
12. Remove three 1/4" hex head bolts holding receiver chassis to mounting board. Remove receiver.
13. Remove four screws holding speaker to cabinet. Remove speaker.

MODEL 802 TRIO-SPEED

GENERAL INFORMATION

The V-M Model 802 Trio-Speed Record Changer is designed to play automatically twelve 10-inch or ten 12-inch, standard 78 RPM or Micro-groove 33⅓ RPM records, not intermixed.

The 7-inch 33⅓ RPM records and the 7-inch 45 RPM records (in conjunction with a record adaptor) may be played on this changer manually.

Any 10 or 12-inch record may be rejected, while playing, by turning the control knob to reject momentarily. The last record will be repeated until the changer is turned off.

Manufactured by

V-M CORPORATION • BENTON HARBOR, MICHIGAN

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DATE 11/49 SET #77 FOLDER #12

V-M
MODEL 802 TRIO-SPEED

V-M
MODEL 802 TRIO-SPEED

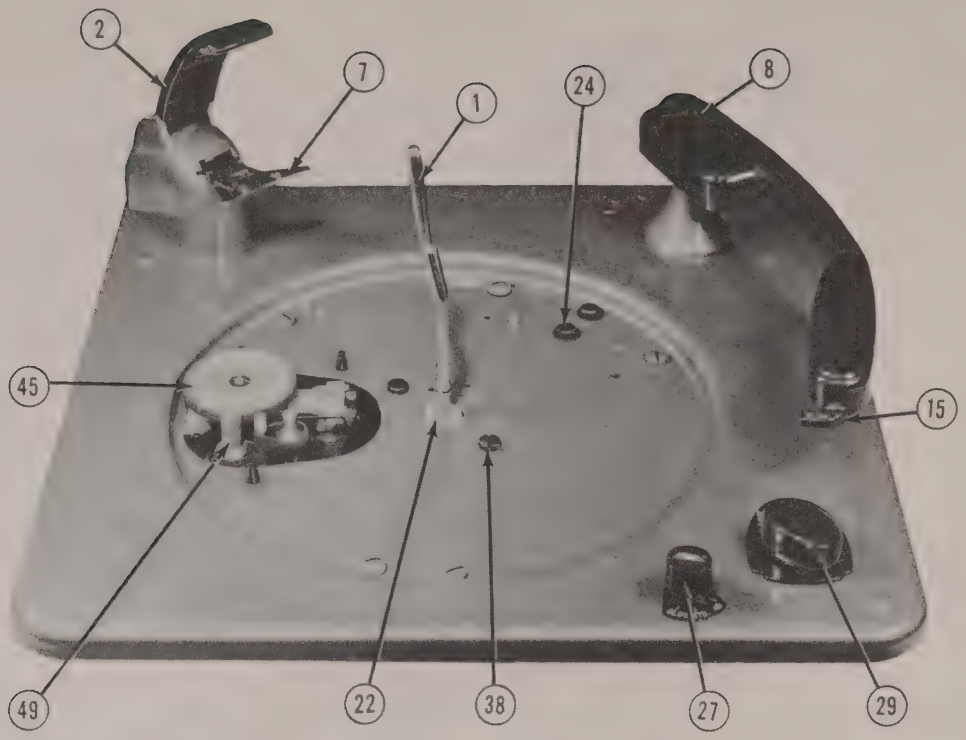


FIGURE 2

Specifications:

The V-M Model 802 Trio-Speed Record Changer is designed to play automatically twelve 10-inch or ten 12-inch, standard 78 RPM or Microgroove 33⅓ RPM records, not intermixed.

The 7-inch 33⅓ RPM records and the 7-inch 45 RPM records (in conjunction with a record adaptor) may be played on this changer manually.

Any 10 or 12-inch record may be rejected, while playing, by turning the control knob to reject momentarily. The last record will be repeated until the changer is turned off.

Power Requirements:

Connect this changer only to 117-volt, 60-cycle A.C. supply unless otherwise specified.

PREPARING FOR OPERATION

Shipping Bolts:

Before placing in operation, the machine must be floated freely on the mounting springs. During shipping, the mechanism is secured by means of the two shipping bolts. To float the changer, remove the turntable by lifting it straight up the spindle. Turn the two shipping bolts in a clockwise direction as far as they will go and replace the turntable. Before the turntable can be fully seated, the drive wheel must be gently pushed back out of the way to prevent damage to rubber tire.

Leveling Record Changer:

It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer baseplate. Use adequate shims to level the record changer pan or radio combination cabinet to achieve perfect level.

OPERATING

Loading of Records on Spindle:

1. Raise HOLD DOWN (2) to upright position.
2. Adjust RECORD EJECTOR (7): For ten-inch records, lift the ejector and pull toward the SPINDLE (1) until it latches in its most forward position. For twelve-inch records, lift the RECORD EJECTOR (7) and push it back into its housing until it is fully retracted.
3. Place stack of records on the SPINDLE (1) and lower stack to the off-set shoulder. Records must rest on both the off-set shoulder of the SPINDLE and the shelf on the Record Ejector.
4. Lower the HOLD DOWN on records.

Caution:

This automatic changer will play ten 12-inch or twelve 10-inch records of either type, long-play or standard. ATTENTION: These two types of recordings must not be mixed together in a stack to be played. The motor speed and needle control knobs must be reset for each type that will be played.

To Play Standard Records—78 RPM 10 and 12-Inch

1. The motor SPEED CONTROL KNOB (27) must be in "STD." position.
2. The dual needle REVERSIBLE CARTRIDGE CONTROL LEVER (15) must be in the "STD." position.
3. To start, turn the CHANGER CONTROL KNOB (29) to "REJ." and release. The changer will operate automatically. The last record will keep repeating until the CHANGER CONTROL KNOB (29) is turned to the "OFF" position.

Rejecting:

To reject a record at any time while the player is in operation, turn the CONTROL KNOB to "REJ." and release.

To Play Long-Play Records 33⅓ RPM 10 and 12-Inch:

1. The motor SPEED CONTROL KNOB (27) must be turned to the "SLOW" position.
2. The dual needle REVERSIBLE CARTRIDGE CONTROL LEVER (15) must be turned to the "SLOW" position.
3. To start, turn the CHANGER CONTROL KNOB (29) to "REJ." and release. The changer will operate automatically. The last record will keep repeating until the CHANGER CONTROL KNOB (29) is turned to the "OFF" position.

Manual Operation:

Odd-size or warped records, also home recordings, should be played manually. Turn the CHANGER CONTROL KNOB to "MAN." position, raise the PICKUP ARM (8), and place the needle on the record at its outer edge.

To Play 7-Inch 45 RPM Records:

Turn the MOTOR SPEED CONTROL KNOB (27) to 45 and the CARTRIDGE CONTROL LEVER (15) to "SLOW," and place the record over the spindle and record adaptor. These records can ONLY be played MANUALLY.

To Play 7-Inch 33⅓ RPM Records:

Turn the MOTOR SPEED CONTROL KNOB (27) to "SLOW" and the CARTRIDGE CONTROL LEVER (15) to "SLOW." Place the record over the SPINDLE. These records can ONLY be played MANUALLY.

GENERAL INFORMATION

Suggestions:

When not in use, it is suggested that both controls—motor and cartridge—be left in "Standard" 78 RPM position. Check needle frequently for damaged tip. CAUTION: When changing needle, put slow needle on slow side of cartridge. A distinctive color identifies slow needle and slow side of cartridge.

Care of Records:

To insure long life for your records, little effort is required. Do not expose them to heat from the sun or from nearby stoves or radiators. Store them preferably in albums, but in any case, keep them always in a cool, dry place, resting vertically. Remove dust and dirt, using a soft cloth and a light circular motion.

Records should never be left resting on the Turntable or Spindle of the Changer.

If Noise Develops:

Noisy scratching indicates worn records or defective needle. Some records will wear longer than others, even if kept equally clean. This is due not only to quality of manufacture and care given the records, but also the kind of music recorded.

Be sure that the power cord plug is making good contact in its receptacle.

THE CHANGE CYCLE

The change cycle may be started by one of two actions:

1. Turning the control knob to "Rej." causes the control cam (76) to actuate the control link (78) and allows the trip link (60) to be pushed away from the follower (83). The follower then tilts and engages the worm (54).

2. As the pickup arm moves into the eccentric groove of the record, the movement of the pickup (8) causes the ratchet (64) to pivot the trip rod (56). As the trip rod pivots, the trip link (60) is also turned, by action of spring (58), releasing the follower (83). The follower, which transmits power for the change cycle, then engages the worm (54) and moves downward. The trip crank and lift rod assembly (74) is now pushed upward through the action of the follower arm (82). The long arm of the trip crank rides up the inclined portion of the index (70), raising the pickup and swinging it out clear of the records. As the follower (83) continues to move downward, the follower arm (82) is pivoted against the adjusting screw (55) of the ejector arm (44), actuating the trigger assembly (36), which, in turn, moves the ejector slide (7) and drops a record to the turntable.

At this point, the follower (83), guided by the follower guide (53), moves up the worm. As the follower arm (82) moves away from the adjusting screw (55) of the ejector arm (44), the ejector slide (7) returns to its rest position. Also, through the action of the follower arm (82), the trip crank and lift rod assembly (74) rides off the inclined portion and down the face of the index (70), positioning the pickup and lowering it to the record. The follower now moves off the worm and is latched by the trip link (60).

Set-Down Point:

To adjust the set-down point, cycle the changer and stop the turntable just before the needle comes down on the record. Loosen the lock nut (69) and adjust the index screw (68). Turning the screw clockwise will move the pickup toward the center; counter-clockwise, the pickup will move away from the record. Adjust the pickup so the needle rests ⅛" in from the edge of the record.

The set-down adjustment may be made with either 10-inch or 12-inch records and should be correct for both. If the set-down has been disturbed by holding the pickup arm during cycle, or if the pickup crank (62) is loose, the following approximate adjustment should be made before adjusting the index screw. Loosen the set screw (63) in the pickup crank and turn the crank until it is stopped by the screw in the baseplate. With the crank in this position, move the pickup arm to about ¼" from the spindle and tighten the set screw.

Needle Pressures (Shure P77):

With the pickup arm control lever (15) in "Std." position, the needle pressure should be between 1 and 1.25 ounces. There is no adjustment for "Std." play pressure inasmuch as the pickup arm is designed to give this needle pressure.

In no case should the needle pressure in the "Slow" position be less than 8 grams. If this pressure is lower than 8 grams, the needle will not track in the record grooves. This may be recognized by "Skidding" of the pickup arm across the record and by failure of the changer to cycle at the end of the record. Improper tracking may also be due to other causes (see "Needle Does Not Track Across Record Correctly").

An accurate scale calibrated in grams must be used in checking this needle pressure.

Pickup Arm Height:

To adjust the height of the pickup arm, loosen the lock nut on screw (18) and turn this screw until the correct adjustment is obtained. To get to this screw, raise the pickup to a vertical position; adjust so the pickup arm clears the unplayed stack of records by about ⅛" at its highest point during the change cycle.

Timing of Record Drop:

The timing of the record drop is adjusted by the screw (55) on the end of the ejector arm (44). The adjustment should be such as to release the bottom record of a stack of ten 12-inch records in cycle.

Ejector Slide Adjustment:

The ejector slide is adjusted by the screw (41). The adjustment should be such that the tabs are normally about 1/32" from the edge of a record.

LUBRICATION

Additional lubrication should not be required for the life of the changer, but in cases of unusual use, or high-operating temperature, the changer should be lubricated as follows:

Apply Lubriplate to:

1. Worm threads (54).
2. Lift rod (74).
3. Contact point between pickup crank (62) and trip crank (74).
4. Follower Arm (82).
   (a) At pivot of fulcrum (59).
   (b) At contact point of trip crank (74).
   (c) At contact point of sub-frame (52).
5. Ejector arm (44).
   (a) At contact point with trigger (36).
   (b) At contact point of follower arm (82) and screw head (55).
6. Index (70) on surfaces of slide for trip crank arm (74).
7. Follower guide (53) where follower (83) bears.

Apply a Small Quantity of Light Oil to:

1. Between turntable shaft (22) and spindle (1).
2. Follower (83) at pivot with follower arm (82).
3. Ejector arm (44) at pivot with ejector fulcrum.
4. Index (70) at bearing with slide bracket (66).

SERVICE INFORMATION

Turntable Does Not Revolve When Control Knob Is Turned to "On" Position:

1. Machine stalled in cycle:
   Turn the turntable (19) clockwise, by hand, until it starts rotating under its own power.
2. No current at motor:
   (a) Check to determine if current is reaching A.C. leads of changer.
   (b) Check the switch (71) to determine if it is closing.
   (c) Check wiring and soldered terminals in the changer.
3. Motor defective:
   Remove turntable to allow motor to operate without load. If current is reaching motor and idler wheel (45) does not rotate, the motor is defective. Repair or replace.
4. Motor idler wheel (45) not engaging turntable rim. If motor pulley is turning but turntable is not:
   (a) Check motor idler assembly to determine if it is free to contact the motor pulley and the turntable.
   (b) Wipe off the inside rim on the turntable to remove flock, or if oily, clean the turntable rim and rubber tire of the idler wheel (45), *shown in exploded view,* with carbon tetrachloride.

Changer Does Not Cycle When Control Knob Is Turned to "Rej." Position:

1. Motor stalled or not driving turntable.
2. Manual reject not actuating trip.
   Turn the control knob to "Rej." position, hold, and see if the hook on the end of the trip link (60) is pulled back sufficiently to allow the worm follower (83) to drop and engage in the worm threads (54).
   (a) If the trip link does not release the follower, check the control link rod (78).
   If the rod is bent, carefully straighten it and check for trip again.
   (b) If the trip link is not restricting the follower, but the follower still does not engage in the worm, the follower must be removed from the follower arm (82) and dirt, or other foreign matter, cleaned from the pivot point and from between the line of contact where the two parts meet. Excessive grease may cause this binding.

To Remove the Follower:

1. Be sure the changer is not in cycle.
2. Remove the turntable.
3. Remove the two screws from base plate and sub-frame (52).
4. Carefully work the sub-frame assembly out of the base plate and revolve the assembly counterclockwise to work off the follower and follower arm.

5. Remove the follower.

(c) If the follower drops but does not engage in the worm:

1. Check for excessive wear in the pivot of the follower and follower arm.
2. Check to see if the spring (81) has become unhooked.
3. Check for dirt in the follower arm pivot.
4. Turntable not engaging turntable lock.
5. Turntable lock loose on turntable shaft.

Record Does Not Drop When Changer Cycles:

1. Check for bent spindle (1).
2. Check for under or over-size record, or enlarged center hole.
3. Check position of ejector slide (7) as given under "Adjustments."
4. Check the screw in the ejector arm (44) to see if it hits the follower arm (82) when the follower is at the bottom of the worm. If the lock nut on this screw has worked loose, reset the screw as given under "Adjustments."
5. Check to see if the ejector slide (7) is properly seated with its pushing mechanism on the trigger (36).
6. Check for a defective trigger by slowly pulling the ejector arm (44) down by hand.

If a record does not drop, the trigger (36) must be repaired or replaced.

To remove the trigger:

(a) Unhook the index spring (42) from the ejector link (35).

(b) Remove the four screws from the base plate and the housing assembly.

(c) Lift the trigger from the housing and check for broken weld on strengthening brace.

Needle Does Not Track Across Record Properly:

1. Check for lack of vertical play of the pickup shaft in the pickup post (21). There should be .003" to .010" play here. To correct, loosen the screw (63) in the pickup crank (62), place a shim between the pickup hinge washer and the pickup post and reset the pickup and pickup crank.
2. Needle may be clogged by accumulation of lint, dirt, etc., or point may be chipped.
3. Follower Arm (82) does not clear the pickup arm trip crank assembly (74) when a cycle is completed:

(a) There should be a .010"-.015" gap between the follower arm (82) and the pickup arm trip crank assembly (74) when the machine is not in cycle. If the gap is small enough to allow the parts to touch and bind as the needle moves across the record, the follower arm (82) should be bent down slightly.

4. Hinge bearing binds:

Place a block between pickup arm (8) and the hinge plate (17) to prevent the needle from touching the turntable. With sensitive gram scale, check the amount of force required to move the pickup arm (8) across the turntable (19). The force required should not exceed two grams. If the pressure required is excessive, check the bearing in the pickup arm post for binding.

5. Changer not level:

(See "Leveling Record Changer" under "Preparing for Operation.")

6. Excessive vibration during a long play:

Any vibration caused by (1) unsteady mounting, (2) floor vibrations, or (3) passing of heavy vehicles may cause the pickup to glide across the record grooves.

7. Check for lack of lubrication between the pickup shaft and the pickup post.

Noise During Playing of Record:

1. Rumble:

(a) From motor: If a low-pitched rumbling sound comes from the loud speaker while a record is being played, check the motor grommets to be sure the motor is setting freely on them. The motor lead wires should have enough slack to allow the motor to float. Motor rumble may also come from an out-of-balance motor rotor. In this case, the motor should be replaced.

(b) From bearings: Defective turntable shaft bearings can cause rumble. Check for foreign matter. Lubricate with lubriplate or light oil.

2. Defective Motor Idler Wheel (45):

A rapid thumping sound while the motor is running may indicate a flat spot on the motor idler wheel (45). Remove the turntable and check the rubber tire on the idler. If the surface of the rubber tire is not smooth and even, replace the idler.

3. Defective Needle:

A bad needle will cause loud needle scratch or hiss through both the speaker and the air directly from the needle.

4. Turntable Scrapes:

If a scraping sound occurs as the turntable (8) revolves, check:

(a) Turntable warped, causing outer rim to rise and fall.
(b) Motor idler (45) bent.

5. Squeaks:

Squeaking sound, as changer operates, indicates lack of lubrication. Lubricate points indicated under "Lubrication."

Turntable Stalls in Cycle:

1. Motor idler (45) not engaging turntable with sufficient tension.
2. Turntable bearing tight.
3. Operating temperature too low.
4. Line voltage too low.
5. Binding between follower and worm:

(a) Check lubrication of follower arm (82) at point of bearing with sub-frame (52).

(b) Check lubrication of worm (54) threads.

(c) File some metal from the follower arm (82) at the point of bearing with the sub-frame (52) to allow more clearance between the worm (54) and the follower (83). The follower arm (82) may be disassembled in the following manner:

1. Remove spring (81).
2. Remove cotter pin (77).
3. Remove follower arm.

Reassemble in the reverse order above.

Excessive Record Wear:

1. Binding in pickup arm.
2. Defective needle.
3. Excessive needle pressure.

Distortion of Recorded Sound:

1. Defective record.
2. Defective amplifier:
   Check phonograph amplifier and speaker.
3. Bad cartridge.

Needle Does Not Set Down Properly on Either 10" or 12" Records:

1. Check the needle for 10" position by holding the index (70) in with the fingers as far as it will go and cycling the changer.
2. Check the needle set down for 12" position by holding the index out with the finger as far as it will go and cycling the changer.
3. If these positions are correct when the index is held in either position, check for "creeping index."
4. Check for bind between guide tabs on the index and the index screw (68).
5. Check for bind between the index and the index slide bracket (66).

Record Hits Pickup Arm:

1. Check timing of changer cycle, as given under "Adjustments."
2. Check for a creeping index (70). Index "creeps" if it moves when changer goes through cycle. To correct this condition:

(a) Be sure that the pickup (8) and the pickup crank (62) are aligned, as given under "Adjustments."

(b) Place the ejector slide (7) in 12" position, cycle the changer until the follower is at the bottom of the worm. The index spring (42) should be just barely slack. The ejector link (35) may be bent forward or back to give the index spring this required slack.

3. Check for too much gap between the follower arm (82) and the trip crank (74). This gap should be about the thickness of a sheet of paper (.005" to .016"). To reduce the gap, do one of the following:

(a) Bend the follower arm up.
(b) Replace the follower arm.

Two Records Drop at Once:

1. Hole in record too large or records too thin.
2. Slide in spindle not fully down.

(a) Check slide to be sure it is free and does not bind at any point. Clean out foreign matter or straighten, if necessary. Do not oil.

(b) When records are placed on spindle, be sure the slide is all the way down.

3. Check for position of ejector slide (7).

Turntable Speed Too Slow:

(Refer to the exploded view).

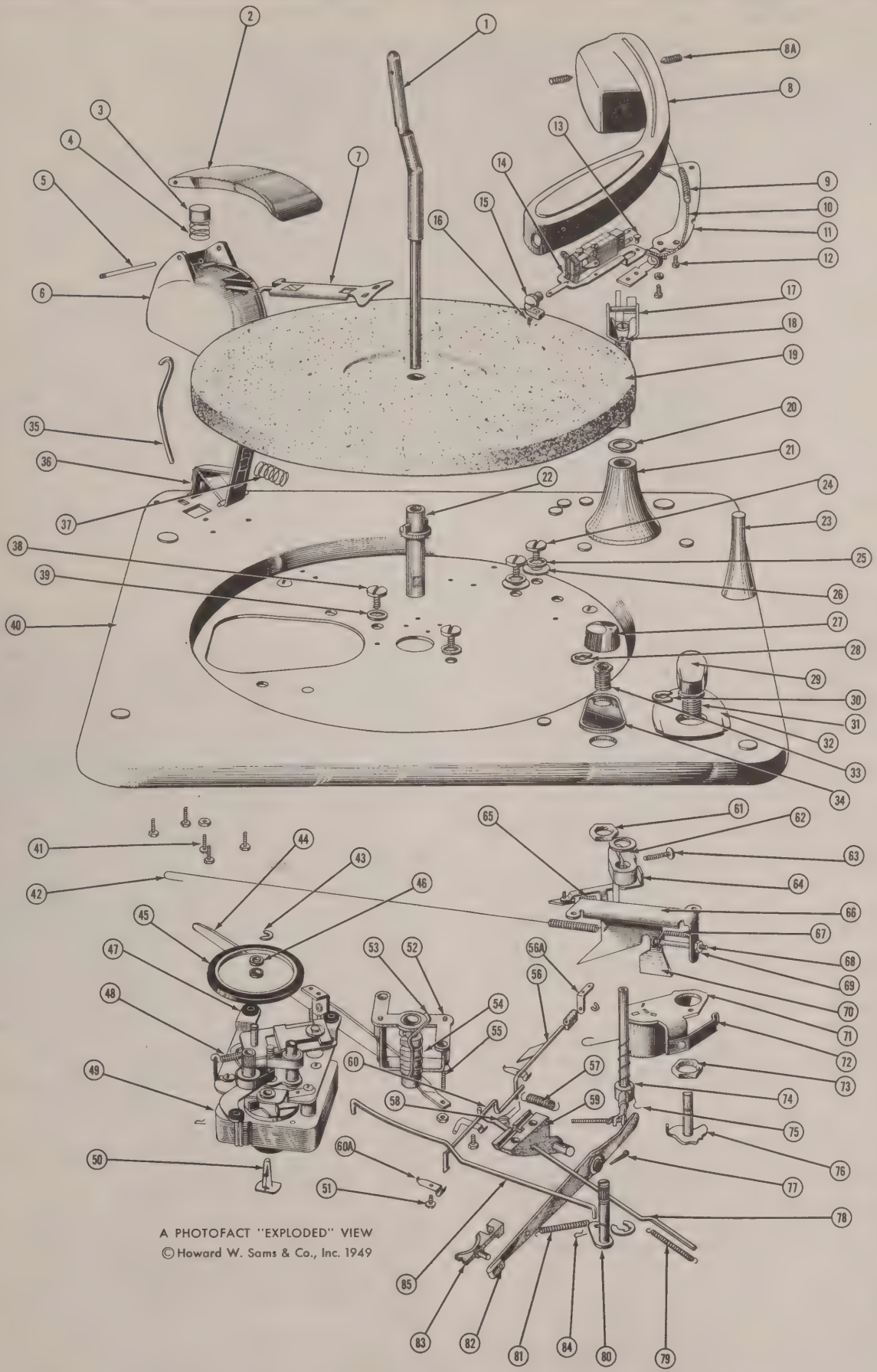
1. Binding in turntable bearing.

Check the turntable bearing (22) for freedom. Hold the motor idler wheel (45) out of engagement with the turntable and spin the turntable, by hand, to see if it turns readily and coasts for a long time. If binding occurs, remove turntable, foreign matter and lubricate with light mineral oil.

2. Motor drive shaft too small in diameter. Replace the motor or spring bushing with one having a greater diameter.
3. Line voltage too low. The line voltage should not be less than 100 volts or the turntable may be too slow.
4. Operating temperature too low. If the machine has been stored in a cold place or operated in surroundings at a temperature of less than 60°F., the turntable speed may be too slow.

Turntable Speed Too Fast:

Motor drive shaft or spring bushing too large in diameter. Replace the motor with one having a smaller diameter shaft or spring bushing.



EXPLODED VIEW V-M 802

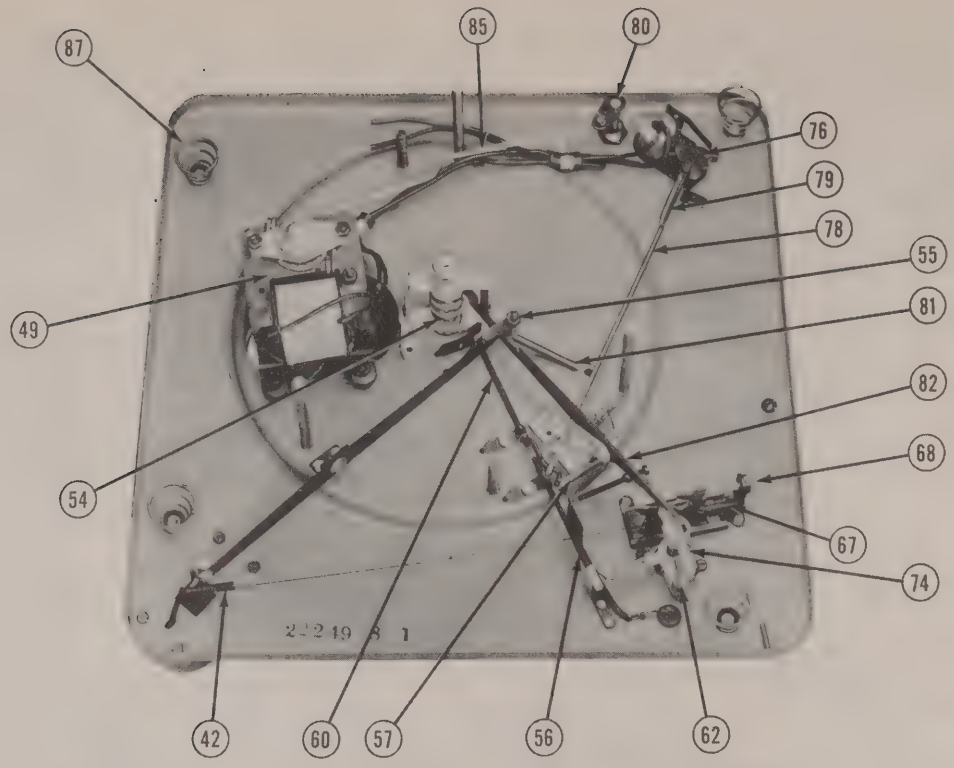


FIGURE 3

Turntable Continues to Rotate When Control Knob Is Turned to "Off" Position:

Switch defective.
Check switch (71) for defects and replace, if necessary.

Changer Trips Before Needle Reaches End of Record:

1. Hole in record too large:
If hole in record is too large, the groove may turn eccentric with the spindle and cause premature tripping.
2. Insufficient tension on trip spring:
The trip spring (57) should have enough tension to pull the trip rod (56) back to a fully engaged position if an eccentric record is being played.
3. Binding in trip rod bearings:
With the trip released, check the trip rod (56) for play in the bearings. It should be free to turn without binding.

Pickup Arm Strikes Records on Spindle When it Raises or Pickup Arm Rest When It Moves Out:

Pickup arm height not adjusted properly. (See instructions for adjusting the pickup arm height under "Adjustments.")

Turntable Will Not Rotate:

1. Motor link (85) not being actuated by the control arm (80).
2. Idler (45) not engaging the drive pulleys or motor shaft.
(a) Spring (48) loose, therefore not pulling the idler (45) in contact with the motor shaft or drive pulleys.
3. Rubber belts on motor broken or out of place.

Changer Continues to Cycle:

1. The trip link (60) must turn freely, and the trip rod return spring (57) must be of the proper tension to provide positive latching of the trip link to the follower (83). Make certain the butterfly spring is adjusted in such a manner so as to hold the trip link (60) and the trip rod (56) together at all times.
2. Reject control holding trip open. Check the control cam assembly (76) and control link (78) for binding to determine if the control assembly is holding the trip rod in a disengaged position from the follower.

Trip Crank (74) Jams on Index (70):

1. Check for lubrication on index at point of bearing with trip crank.
2. Check for burrs on the inclined surface of the index (70). Surface must be very smooth. Polish with crocus cloth.
3. Check for grooves worn into trip crank arm (74) at contact point with index. File smooth with fine file, if necessary.

Changer Does Not Cycle When Record Has Been Played:

1. Check to be sure the control knob is in "AUT." position.
2. If the changer does not trip, push the trip rod (56) back, by hand, and see if the hook on the trip link (60) is pulled back sufficiently to release the worm follower. If the trip link does not release the follower, check for the following:
(a) Bind between trip link bracket (60A) and trip link.
(b) If the above doesn't show trouble, bend the tail of the trip link (60) in toward the side of the fulcrum. This will allow the hook on the other end of the trip link to pull back farther.
(c) Spring (57) weak or unhooked.
3. If the changer continues to trip, check for the following:
(a) Too much clearance between the hook on the trip link and the follower; correct by bending the tail of the trip link assembly away from the side of the fulcrum. This will cause the hook end of the trip link to engage the follower more closely.
4. If the needle jumps out of the eccentric groove on record:
(a) Check trip pressure. The lateral pressure should not exceed 6 grams (if the pressure is excessive see "Changer Trips Before Needle Reaches End of Record"). Suspend the pickup arm approximately two inches above the turntable by means of a long length of heavy sewing thread attached to an overhead bracket approximately 2 feet to 5 ft. above the record changer. Using a gram scale, measure the amount of horizontal pull on the pickup arm after the arm has become engaged with the ratchet trip assembly. If the trip pressure is too high, check:
1. For binding.
2. Spring (57) too strong. May be weakened by carefully stretching out one of the center loops.
3. Record may be defective. The trip grooves are often too shallow. Check with a record known to be good.
4. Needle point may be worn.
5. Check hinge bearing for binding. (See "Needle Does Not Track Across Record Properly"—4.)
5. Binding in trip rod bearings: (See "Changer Trips Before Needle Reaches End of Record"—3.)
6. No eccentric trip groove on record:
All standard records made today have an eccentric trip groove, but some records made in the past did not have this groove. When records of this type are being played, the control knob must be turned to "Rej." at the end of the record.
7. Ratchet pawl not engaging the ratchet sector:
The ratchet pawl (64A) must press against the ratchet sector forcing it back when the motion of the pickup arm is reversed. If the pawl does not contact the ratchet sector or slides over it:
(a) Check the pawl (64A) for burrs around the hole.
(b) Be sure the pawl is free to turn on the bearing. If the drive pin is driven down too far causing binding, the pin may be relieved by tapping up on the shank.
(c) Check the pawl spring (65) for insufficient tension.
(d) Check the point on the pawl. It should be sharp to

enable it to dig into the ratchet teeth. Sharpen with stone if necessary.

8. Ratchet sector too far away from ratchet pawl:

If the ratchet sector (56B) is too far away from the pawl (64A), the eccentric motion required to operate the trip will be excessive. If necessary, bend the trip bracket in slightly to reduce this distance. If the sector is too close to the pawl, excessive trip pressure will result.

9. Needle jumps out of eccentric groove in record:

(a) Check trip pressure (see paragraph 4A).

(b) The record may be defective. The trip groove is often too shallow. Check with a record which is known to be good.

(c) The needle point may be damaged or affected by an excessive accumulation of dust, lint, etc. Check needle pressure as described under "Adjustments."

(d) There may be binding in the pickup bearing or ratchet arm (see 2 and 3 "Needle Does Not Track Across Record Properly").

Defective Cartridge (Shure P77):

To remove cartridge, proceed in the following manner:

1. Remove the plastic cartridge control lever.
2. Carefully pull the cartridge lead up from the rear section of the arm until adequate slack is obtained.
3. Remove the two screws that are used to attach pickup cartridge to the pickup cartridge mounting bracket.
4. Disconnect the pickup leads and remove cartridge.
5. Replace cartridge and connect pickup leads.
6. Secure pickup cartridge to pickup cartridge mounting bracket.
7. Push excess pickup lead into rear section of pickup arm and reinstall plastic cartridge control lever.

Damaged Needle (Shure P77):

To remove the needle, proceed in the following manner:

1. Rotate cartridge control lever to correspond with needle to be removed.
2. Loosen knurled thumb nut that secures needle to the cartridge.
3. Carefully remove the needle and replace with a new needle of the same part number. CAUTION: MAKE SURE THAT THE COLORED NEEDLE IS USED ON THE SIDE OF THE PICKUP CARTRIDGE HAVING THE CORRESPONDING COLOR SPOT. The replacement needle will have to be adjusted before it is tightened in the pickup cartridge to assure that the needle shank is securely held by the knurled thumb nut. DO NOT USE PLIERS ON KNURLED THUMB NUT. TIGHTEN WITH FINGERS ONLY.

To remove the needle from Webster Cartridge:

1. Remove the cartridge control knob (15).
2. Loosen set screw holding needle in place.
3. Turn needle 180° and remove it. Replace only with identical type of needle. CAUTION: Insert so that the needle end marked with red is on same side of cartridge marked with red dot.

To remove the needles from Astatic Cartridge:

1. The needles may be removed from the Astatic Cartridge by merely pulling them from the cartridge, being careful not to damage the cartridge in any way.

No Sound During Playing:

1. Defective cartridge.
2. Defective wiring:
   Check pickup leads for a shorted or open lead.
3. Defective amplifier.

Excessive Record Wear:

1. Binding in pickup arm (see 1 and 2—"Needle Does Not Track Across Record Properly").
2. Use of "Std." needle on long-play record will cause excessive wear.

PARTS LIST FOR V-M 802 TRIO-SPEED

Ref. No.	*Part No.*	DESCRIPTION	*List Price*
1	2414	Spindle assembly—consists of:	$ 1.65
	1535	Pin	.04
	1676	Spindle guide	.21
	1687	Spring	.02
	2413	Spindle shaft	1.05
2	1746	Plastic hold down	.23
3	2757	Hold-down cup	.03
4	428	Push spring	.01
5	941-A	Hinge pin	.10
6	760	Housing assembly—consists of:	4.80
	428	Push spring (item 4)	.01
	695	Ejector link (item 35)	.04
	941-A	Hinge pin (item 5)	.10
	1746	Plastic hold-down (item 2)	.23
	1793	Housing (item 6)	1.19
	1802	Ejector slide (item 7)	.34
	777	Trigger assembly (item 36)	.45
7	1802	Ejector slide	.34
8	2633	Tone arm assembly—consists of:	10.85
	713	Screw	.01
	2310	Screw pivot (item 8A)	.02
	2317	Screw	.02
	2336	Knob (item 15)	.12
	2370	Screw-knob	.02
	2372	Tone arm (item 8)	.77
	2376	Hinge assembly (item 17)	.60
	2377	Strengthener assembly (Webster cartridge)	.19
	2378	Cable and clip assembly (Webster cartridge)	.13
	2493	Spring and chain assembly	.21
	2197	Cartridge (Webster F-14 with needle)	8.75
	2630	Dual needle for Webster cartridge	2.60
	2606	Cartridge (Shure P-77) with needles	8.75
	2628	One Mil needle for Shure cartridge	1.35
	2629	Three Mil needle for Shure cartridge	1.20
	2631	Screw mounting (for Shure cartridge)	.01
	2693	Strengthener and bracket assembly (for Shure cartridge)	.27
	2694	Cable and clip assembly (Shure cartridge)	.13
	2353	Cartridge (Astatic LQDM) with needles	8.75
	2754	One Mil needle for LQDM cartridge	1.35
	2755	Three Mil needle for LQDM cartridge	1.20
9 & 10	2493	Spindle and chain assembly	.21
11	2377	Strengthener and pivot assembly—consists of:	.19
	2307	Eyelet	.01
	2312	Spring	.04
	2313	Strengthener	.05
	2318	Pivot bracket	.05
12	713	Strengthener mounting screw	$ .10
13		Rivet	
14		Cartridge (see item 8 for cartridge and needle)	
15	2336	Knob (cartridge control)	.12
16	2370	Screw—knob	.02
17	2376	Pickup hinge assembly—consists of:	.60
	48	Fiber washer (item 20)	.01
	698	Shaft	.24
	940	Hinge	.16
	2309	Hinge pin	.05
	2314	Bracket	.03
18	1520	Height adjustment screw and nut assembly	.02
19	2738	Turntable	2.00
20	48	Fiber washer 3/8 x 9/16 x 1/32	.02
21	681	Pickup post	.44
22	1805	Turntable shaft assembly—consists of:	.62
	679	Lock	.07
	1804	Shaft	.53
23	981-B	Pickup rest	.15
24	409	Fulcrum mounting screw	
25	136	Lockwasher internal No. 6	.01
26	126	Flatwasher	.01
27	2198	Knob-speed control	.18
28	1719	"C" washer	
29	1711-B	Knob	.15
30	1719	"C" washer 1/2 O.D.	.01
31	1789	Control shaft bearing (on-off-reject)	.17
32	963-3G	Escutcheon	.18
33	2354	Control shaft bearing (motor speed control)	.15
34	2739	Escutcheon—speed	.13
35	695	Ejector link	.04
36	777	Trigger assembly	.45
37	428	Trigger assembly return spring	.01
38		Screw—sub-frame	
39		Internal lock washer	
40	2746	Base plate assembly—consists of:	4.00
	89	Clamp	.02
	127	Clamp	.04
	478	Spring	.01
	681	Post	.44
	1806	Index slide assembly (item 66)	.47
	1895	Terminal strip	.05
	2740	Leg stud	.09
	2077	Shipping bolt	.03
	2305	Bearing	.09
	2743	Base plate	2.40
	2494	Rubber grommet	.04
41	1668	Screw No. 6-32 x 1/2 B.H.	.01
42	884	Index spring	.13
43		"C" washer (part of item No. 49)	

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

PARTS LIST—*Continued*

Ref. No.	*Part No.*	DESCRIPTION	*List Price*
44	1821	Ejector and fulcrum assembly—consists of:	$ .36
		669 Ejector arm	.31
		705 Rivet	.01
		1766 Ejector arm fulcrum	.02
45	2772	Idler wheel	1.15
46		Felt washer (part of item No. 49)	
47	2773	Motor mounting grommet (part of item No. 49)	.04
48		Idler wheel tension spring (part of item No. 49)	
49	2727	Motor (Gen. Industries 117V, 60 cy. AC) includes	12.50
		2772 Idler wheel	1.15
		2773 Mounting grommet	.04
		2797 Drive belts, 2 used	ea. .46
50	1685	Motor snap fasteners	.04
51		Bearing mounting screw	
52	2411	Sub-frame assembly—consists of:	2.08
		680 Worm (item 54)	.48
		707 Set screw	.07
		724 Ball bearing	.01
		875 Follower guide (item 53)	.05
		1805 Turntable shaft assembly (item 22)	.51
		2409 Sub-frame bushing	.08
		2415 Sub-frame (item 52)	.72
53	875	Follower guide	.05
54	680	Worm	.48
55	1807	Screw No. 6-32 Phillips hd.	.01
56	2705	Ratchet assembly—consists of:	.22
		2330 Ratchet	.12
		2686 Rod and plate assembly	.08
56A	2305	Ratchet assembly bearing (part of item No. 40)	
57	1909	Spring control	.10
58	2327	Spring trip	.38
59	926	Fulcrum	.48
60	2709	Trip link	.15
60A	2302	Trip link bearing	.02
61	1660	Control bearing nut	.01
62	2623	Crank and ratchet pawl assembly—consists of:	.62
		711 Screw	.01
		1547 Pin	.01
		1606 Pawl	.06
		2329 Pawl spring	.10
		2621 Pickup crank	.38
63	711	Screw No. 10-32 x 5/8	
64	2623	Ratchet pawl arm assembly	
65	2329	Pawl spring	.10
66	1806	Index slide assembly—consists of:	$ .47
		712 Nut (item 69)	.01
		1663 Spring (item 67)	.04
		1785 Index (item 70)	.09
		1786 Slide bracket (item 66)	.12
		2177 Index screw (item 68)	.10
67	1663	Index spring	.04
68	2177	Index screw	.10
69	712	Nut	.01
70	1785	Index	.09
71	1748	Switch bracket assembly—consists of:	.47
		94 Rivet	.01
		467 Switch	.32
		1769 Switch bracket	.08
		1788 Cam spring (item 72)	.02
72	1788	Cam spring	.02
73	1660	Control bearing nut	.01
74	2685	Trip crank assembly—consists of:	.72
		833 Lift pin	.25
		1796 Trip crank	.29
		1983 Spring (item 75)	.04
		2679 Screw	.03
75	1983	Spring	.04
76	1800	Control cam assembly—consists of:	.19
		1770 Control cam shaft	.09
		1774 Control cam	.04
77	996	Cotter pin	.01
78	2708	Control link	.14
79	1909	Control link spring	.10
80	2750	Shaft and arm assembly—consists of:	.25
		1719 "C" washer	.01
		2355 Arm	.04
		2367 Shaft	.16
81	1876	Spring—follower arm	.13
82	1791	Follower arm assembly—consists of:	.59
		1792 Follower arm bushing	.06
		1797 Follower arm	.51
83	1795	Follower	.23
84	2661	Cotter pin	.01
85	2741	Motor link	.16
86	2749	Adapter and sticker assembly—consists of:	.25
		2683-B Adaptor (for playing 7) records	
		2695 Sticker	
87	478	Spring	.01

STANDARD PRODUCT WARRANTY

The manufacturer warrants each of its products manufactured by it to be free from defective material and workmanship and agrees to remedy any such defect or to furnish a new part in exchange for any part of any unit of its manufacture which under normal installation, use and service discloses such defect, provided the unit is delivered by the owner to us intact, for our examination, with all transportation charges prepaid to our factory within ninety days from the date of sale to original purchaser and provided that such examination discloses in our judgment that it is thus defective.

This Warranty does not extend to any of our products which have been subjected to misuse, neglect, accident, incorrect wiring not our own, improper installation, or to use in violation of instructions furnished by us, nor extend to units which have been repaired or altered outside of our factory nor to cases where the serial number thereof has been removed, defaced or changed.

Any part of a unit approved for remedy or exchange hereunder will be remedied or exchanged by us without charge to the owner.

This Warranty is in lieu of all other Warranties expressed or implied and no representative or person is authorized to assume for us any other liability in connection with the sale of our products.

V-M CORPORATION

BENTON HARBOR, MICHIGAN

FORM NO. 2798

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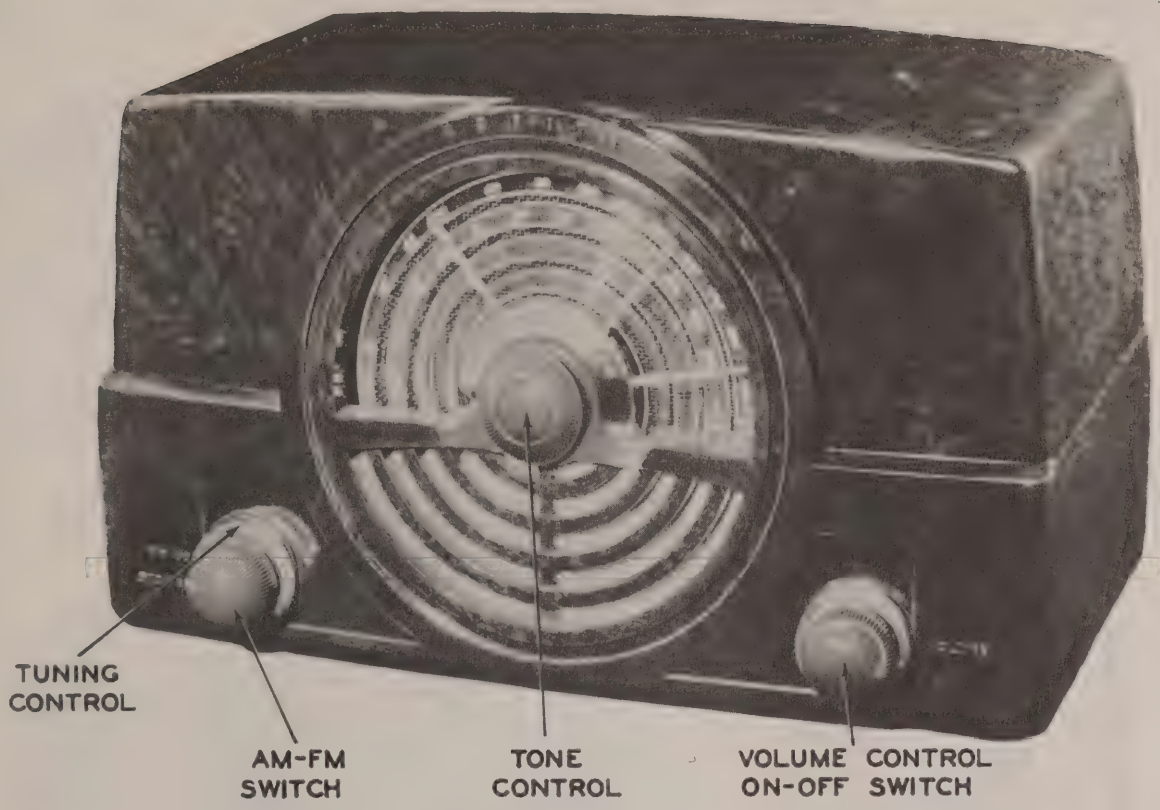
ZENITH MODELS 7H920, 7H920W (Ch. 7F01)



ZENITH MODELS 7H920, 7H920W (Ch. 7F01)

ZENITH MODEL 7H920

TRADE NAME	Zenith, Model 7H920, 7H920W (Ch. 7F01)
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Illinois
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver with Loop Antenna
TUBES(SEVEN)	Types 12BA6 RF Amp., 12AT7 Converter, 12BA6 1st IF Amp., 12BA6 2nd IF Amp., 12AU6 Limiter, 19T8 DET-AVC-AF, 35B5 Power Output
POWER SUPPLY	110-120 Volts AC-DC RATING: .42 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis Indiana

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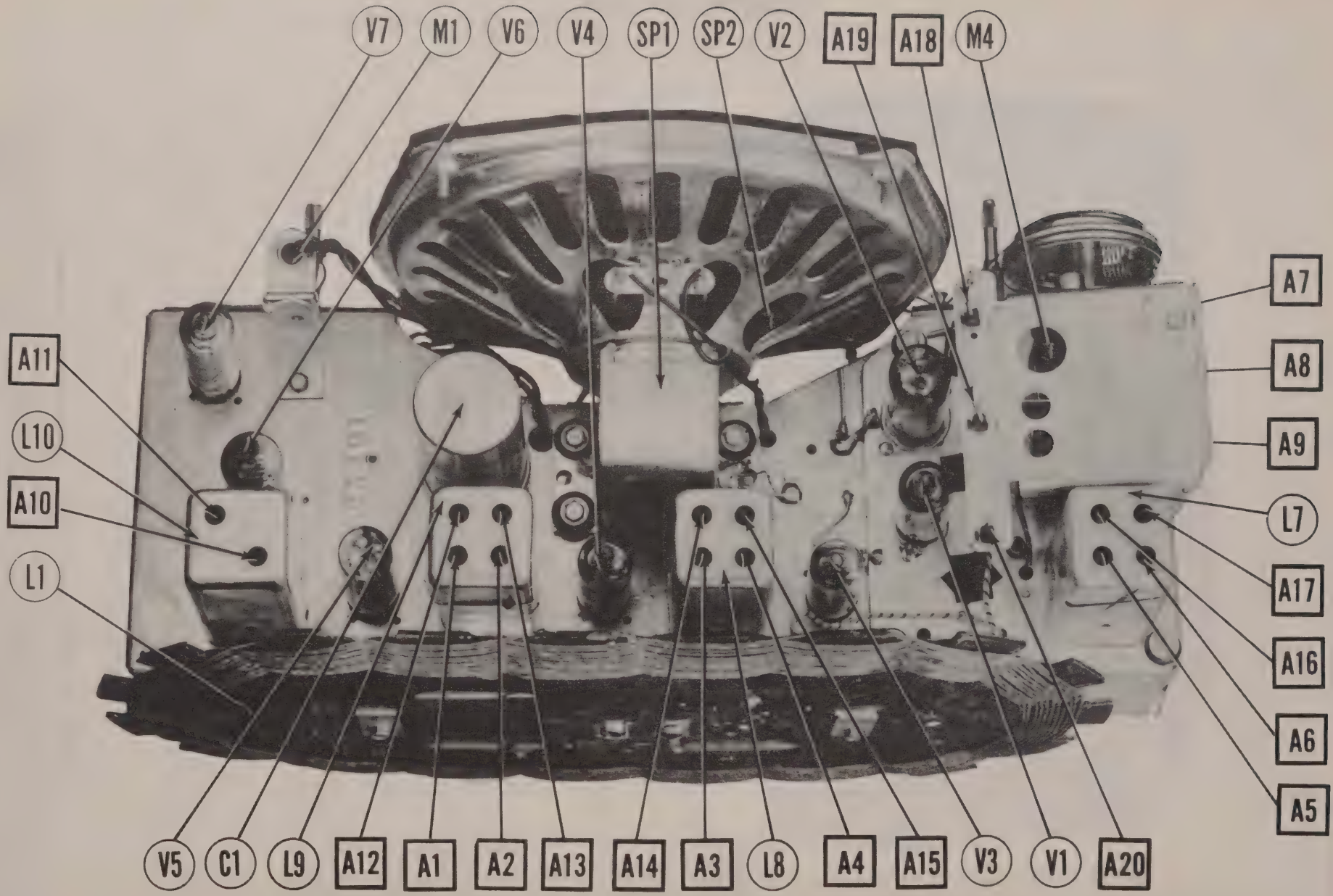
DATE 11/49 SET #77 FOLDER 13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C29
C30
R1
C32
R35
C31
R34
C20
R37
R36
C28

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RMA BASE TYPE	INSTALLATION NOTES
V1	RF Amp.	12BA6	12BA6	7BK	
V2	Converter	12AT7	12AT7	9A	
V3	1st IF Amp.	12BA6	12BA6	7BK	
V4	2nd IF Amp.	12BA6	12BA6	7BK	
V5	Limiter	12AU6	12AU6	7BK	
V6	DET.-AVC-AF	19T8	19T8	9E	
V7	Power Output	35B5	35B5	7BZ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: ZENITH PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	SPRAGUE PART No.	IDENTIFICATION CODES AND INSTALLATION NOTES
C1A	80	150	22-1661	AF886D4A*	UP443150*		D5198	● Filter
B	40	150		PRS150/50	BR8015			■ Filter
C	40	150						▲ Filter
D	40	25						Output Cath. Bypass
C2	10000		22-3	P488-01	GT4S1	821-01	36C1	FM Ant. Isolation
C3	100		22-1669	1468-0001	5W5T1	GP1K-100	1FM-31	FM Ant. Coupling
C4	22		22-1506			N080-331-22		Fixed Trimmer
C5	1000		22-1676	1468-001	1W5D1	GP2L-001	1FM-21	RF Screen Bypass
C6	30		22-1705	1468-00004	5W5Q4	GP1K-33	1FM-44	RF Cath. Bypass
C7	100		22-1669	1468-0001	5W5T1	GP1K-100	1FM-31	RF Plate Dec.
C8	22		22-1506			N080-331-22		Fixed Trimmer
C9	.05	200	22-829	P288-05	GT2S5		TM-15	AVC Filter
C10	.68		22-1766					Osc. Coupling
C11	50		22-1367	1468-00005	5W5Q5	GP1K-50	1FM-45	Osc. Grid Cap.
C12	22		22-1506			N080-331-22		Fixed Trimmer
C13	1000		22-1676	1468-001	1W5D1	GP2L-001	1FM-21	Osc. Plate Decoupling
C14	1000		22-1676	1468-001	1W5D1	GP2L-001	1FM-21	Conv. Cath. Bypass
C15	10000		22-3	P488-01	GT4S1	821-01	36C1	Conv. Fil. Bypass
C16	10000		22-3	P488-01	GT4S1	821-01	36C1	Conv. Plate Decoupling
C17	.05	200	22-829	P288-05	GT2S5		TM-15	AVC Filter
C18	.002	600	22-1220	P688-002	GT6D2	GP2M-002	TM-22	1st IF Decoupling
C19	10000		22-3	P488-01	GT4S1	821-01	36C1	2nd IF Cath. Bypass
C20	10000		22-3	P488-01	GT4S1	821-01	36C1	2nd IF Fil. Bypass
C21	.002	600	22-1220	P688-002	GT6D2	GP2M-002	TM-22	2nd IF Decoupling
C22	100		22-1669	1468-0001	5W5T1	GP1K-100	1FM-31	Diode RF Filter
C23	25		22-1507	1468-000025	5W5Q25	GP1K-25	MS-425	IF Coupling
C24	10000		22-3	P488-01	GT4S1	821-01	36C1	Limiter Decoupling
C25	10000		22-3	P488-01	GT4S1	821-01	36C1	Limiter Plate Dec.
C26	10000		22-3	P488-01	GT4S1	821-01	36C1	Limiter Fil. Bypass
C27	100	500	22-1669	1468-0001	5W5T1	GP1K-100	1FM-31	RF Bypass
C28	10000		22-3	P488-01	GT4S1	821-01	36C1	Audio Coupling
C29	10000		22-3	P488-01	GT4S1	821-01	36C1	Vol. Cont. Isolation
C30	.02	400	22-1683	P488-02	GT4S2		TM-12	Audio Coupling
C31	.1	200	22-2084	P288-1	GT2P1		TM-1	Tone Compensation
C32	.1	200	22-2084	P288-1	GT2P1		TM-1	Tone Compensation
C33	.0005	600	22-854	1468-0005	GT6T5	GP2K-500	TC-35	AF Plate Bypass
C34	.05	200	22-829	P288-05	GT2S5		TM-15	AF Plate Dec.
C35	.02	600	22-830	P688-02	GT6S2		TM-12	Audio Coupling
C36	.005	600	22-1702	P688-005	GT6D5	GP2M-005	TM-25	Tone Compensation
C37	.05	400	22-1775	P488-05	GT4S5		TM-15	Line Filter

* Parallel sections to obtain desired capacity.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	INSTALLATION NOTES
R1A	2.5Meg.	½	63-1584	Q11-239	AM-84-S	Volume control
B	Shaft		Not Req.	Not Req.	KSS-3	Attach to R1A per instructions
C	Switch		Not Req.	76-1	SW-A	Attach to R1A per instructions
R2	50KΩ	½	63-1582			Tone control

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES.: PRI.	DC RES.: SEC.	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: MEISSNER PART No.	NOTES
L5	FM Osc.	0Ω	0Ω	S-15733		
L6	AM Osc.	1Ω	4Ω	S-15888	14-1060	
L7A	1st FM IF	.5Ω		S-15981		
B	1st AM IF	9Ω	9.5Ω#			# Includes both secondaries.
L8A	2nd FM IF			S-13971		§ Includes both primaries.
B	2nd AM IF	9.5Ω§	9.5Ω#			# Includes both secondaries.
L9A	3rd FM IF		.5Ω	S-13972		§ Includes both primaries.
B	3rd AM IF	9.5Ω§	9Ω			
L10	Disc. Trans.	.4Ω	.4Ω	S-13973		
L11	Line Choke	.1Ω		S-12256		

DIAL LIGHTS

ITEM No.	BASE TYPE	VOLTS	AMPS.	BEAD COLOR	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA	NOTES
M1	Bayonet	115			100-97		115V-125V 10W

SELENIUM RECTIFIER

ITEM No.	RATING: CURRENT	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: SYLVANIA PART No.	REPLACEMENT DATA	NOTES
M2	.110	212-3	ND-5		

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M3	Switch	85-464	Band
M4	3 Gang. Var. Cap.	22-1677	(24-410MMF, 16-213MMF, 18-92MMF)
	Dial	26-389	
	Knob	46-538	Tuning
	Knob	46-688	Tone
	Knob	46-718	Band Switch
	Knob	S-14129	Volume
	Cabinet	14-851	Model 7H920W
	Cabinet	14-1020	Model 7H920

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		IDENTIFICATION CODES
	RESISTANCE	WATTS	ZENITH PART No.	IRC PART No.	
R3	680Ω	½	63-1779	BTS-680	RF Screen Decoupling
R4	68Ω	½	63-1737		RF Cathode
R5	470Ω	½	63-1772	BTS-470	RF Plate Decoupling
R6	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AVC Network
R7	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AVC Network
R8	100Ω	½	63-1744		Parasitic Supp.
R9	2200Ω	½	63-1800	BTS-2200	Conv. Cathode
R10	10KΩ	½	63-1828	BTS-10K	Osc. Grid
R11	1000Ω	½	63-1785	BTS-1000	Osc. Plate Decoupling
R12	680Ω	½	63-1779	BTS-680	Conv. Plate Decoupling
R13	2.2 Meg.	½	63-1926	BTS-2.2 Meg.	AVC Network
R14	1000Ω	½	63-1786	BTS-1000	De-emphasis
R15	680Ω	½	63-1779	BTS-680	1st IF Decoupling
R16	100Ω	½	63-1744		2nd IF Cathode
R17	680Ω	½	63-1779	BTS-680	2nd IF Decoupling
R18	470KΩ	½	63-1898	BTS-470K	Diode Load
R19	47KΩ	½	63-1856	BTS-47K	Diode Filter
R20	100KΩ	½	63-1870	BTS-100K	Limiter Grid
R21	3300Ω	½	63-1806	BTS-3300	Limiter Decoupling
R22	8200Ω	½	63-1824	BTS-8200	Limiter Plate Decoupling
R23	3900Ω	½	63-1810	BTS-3900	Voltage Divider
R24	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R25	150KΩ	½	63-1876	BTS-150K	Disc. Diode Load
R26	100KΩ	½	63-1870	BTS-100K	De-emphasis
R27	4.7 Meg.	½	63-1940	BTS-4.7 Meg.	AF Grid
R28	470KΩ	½	63-1898	BTS-470K	AF Plate
R29	100KΩ	½	63-1870	BTS-100K	AF Plate Decoupling
R30	470KΩ	½	63-1898	BTS-470K	Output Grid
R31	120Ω	½	63-1747	BW-½-120	Output Cathode
R32	5600Ω	½	63-1817	BTS-5600	Tone Compensation
R33	270Ω	2	63-1452	BW-2-270	Filter (Wire Wound)
R34	330Ω	2	63-1202	BW-2-330	Filter (Wire Wound)
R35	2200Ω	½	63-1799	BTS-2200	Tone Compensation
R36	1000Ω	½	63-1785	BTS-1000	Tone Compensation
R37	22Ω	1	63-1450		Surge Limiter (Wire Wound)

TRANSFORMER (AUDIO OUTPUT)

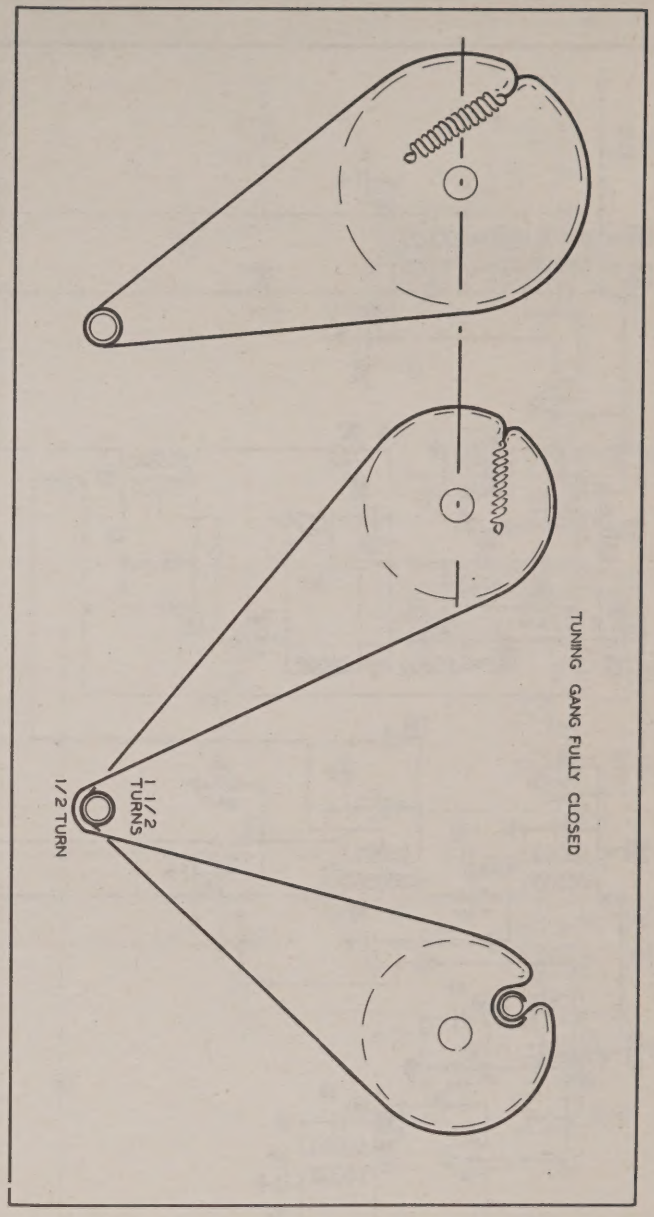
ITEM No.	RATING				REPLACEMENT DATA				INSTALLATION NOTES
	IMPEDANCE		DC RES.		ZENITH PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	
	PRI.	SEC.	PRI.	SEC.					
T1	2700Ω	3.6Ω	233Ω Tap. @ 2.7Ω	.5Ω	95-1035	A-3330 †	A-3031 †	RO-3 †	† Drill one new mounting hole.

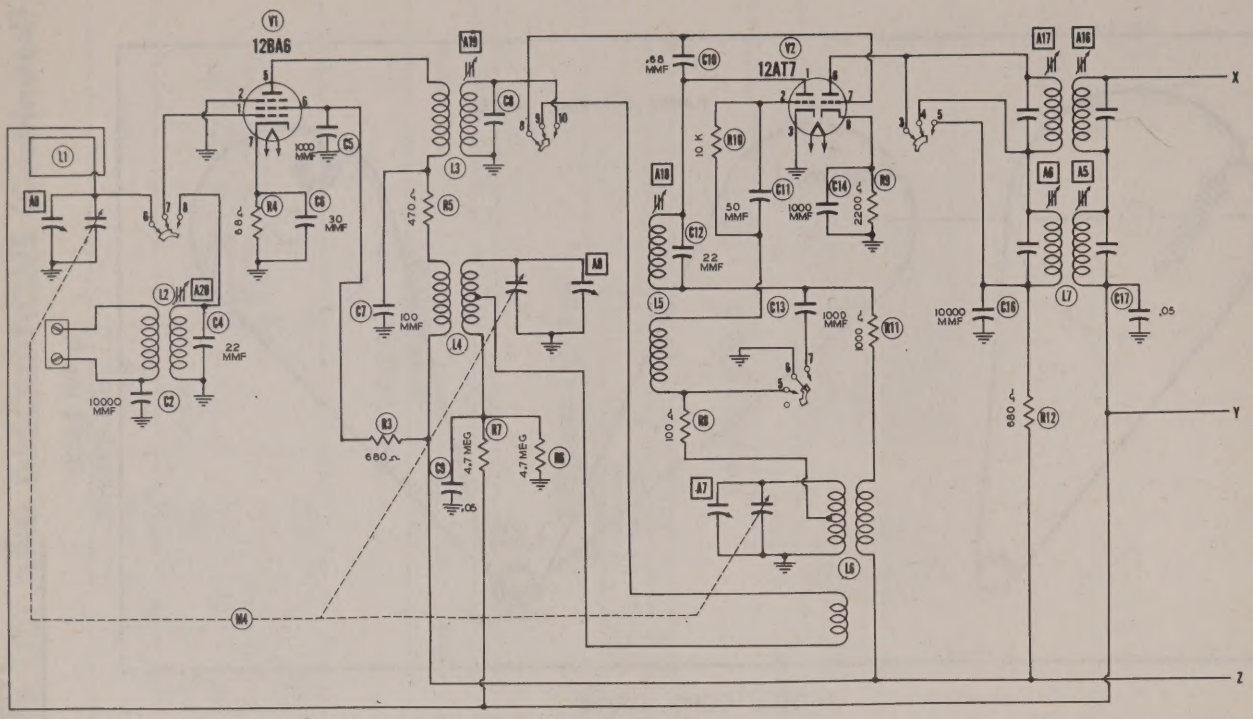
SPEAKER

ITEM No.	RATINGS		REPLACEMENT DATA			INSTALLATION NOTES
			ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
	FIELD	V. C. IMP.		ST-115 ‡		‡ Drill and tap magnet frame.
SP1	PM	3.6Ω	49-608	MOD.P8-V	8A21	
	CONE DIA.	V. C. DIA.				
SP2	7 3/8"	3/4"	208-608			

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA		NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	
L1	AM Loop Ant.	.1Ω	1Ω	S-13977		
L2	FM Ant.	0Ω		S-14192		
L3	FM RF	0Ω	0Ω	S-15743		
L4	AM RF	3Ω	11Ω	S-13974		





VOLTAGE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	-.1VDC	0V	45VAC	57VAC	100VDC	100VDC	.6VDC		
V2A	12AT7	95VDC	$-1.5VDC	0V	70VAC	57VAC	100VDC	0V	3VDC	75VAC
‡ V2B	12AT7	90VDC	$-.5VDC	0V	70VAC	57VAC	100VDC	0V	3.4VDC	75VAC
V3	12BA6	-.1VDC	0V	45VAC	35VAC	90VDC	90VDC	0V		
V4	12BA6	0V	0V	34VAC	24VAC	95VDC	95VDC	.9VDC		
‡ V5	12AU6	-.3VDC	0V	24VAC	15VAC	15VDC	67VDC	0V		
V6A	19T8	-.4VDC	-.4VDC	0V	0V	15VAC	-.4VDC	0V	-.4VDC	40VDC
‡ V6B	19T8	-.6VDC	-1.4VDC	3VDC	0V	15VAC	0V	0V	-.5VDC	40VDC
V7	35B5	.1VDC	5.4VDC	117VAC	70VAC	120VDC	100VDC	.1VDC		

$TAKEN WITH VACUUM TUBE VOLTMETER.

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BA6	2.5Meg.	0Ω	44Ω	52Ω	†1.1KΩ	†1.3KΩ	68Ω		
V2A	12AT7	†1.5KΩ	10KΩ	0Ω	60Ω	52Ω	†1.3KΩ	3.5Meg.	2.2KΩ	52Ω
‡ V2B	12AT7	†1.5KΩ	10KΩ	0Ω	60Ω	52Ω	†1.3KΩ	0Ω	2.2KΩ	52Ω
V3	12BA6	2.2Meg.	0Ω	44Ω	36Ω	†1.3KΩ	†1.3KΩ	0Ω		
V4	12BA6	3Ω	0Ω	36Ω	27Ω	†1.3KΩ	†1.3KΩ	100Ω		
‡ V5	12AU6	100KΩ	0Ω	27Ω	18Ω	†12KΩ	†4KΩ	0Ω		
V6A	19T8	150KΩ	150KΩ	300KΩ	0Ω	18Ω	500KΩ	0Ω	4.7Meg.	1570KΩ
‡ V6B	19T8	150KΩ	150KΩ	300KΩ	0Ω	18Ω	500KΩ	0Ω	4.7Meg.	1570KΩ
V7	35B5	470KΩ	120Ω	80Ω	60Ω	†220Ω	†65Ω	470KΩ		

‡ VOLTAGE AND RESISTANCE READINGS TAKEN IN FM POSITION.

† Measured from output of M2.

1. DC Voltage measurements are at 20,000 ohms per volt; AC Voltages measured at 1,000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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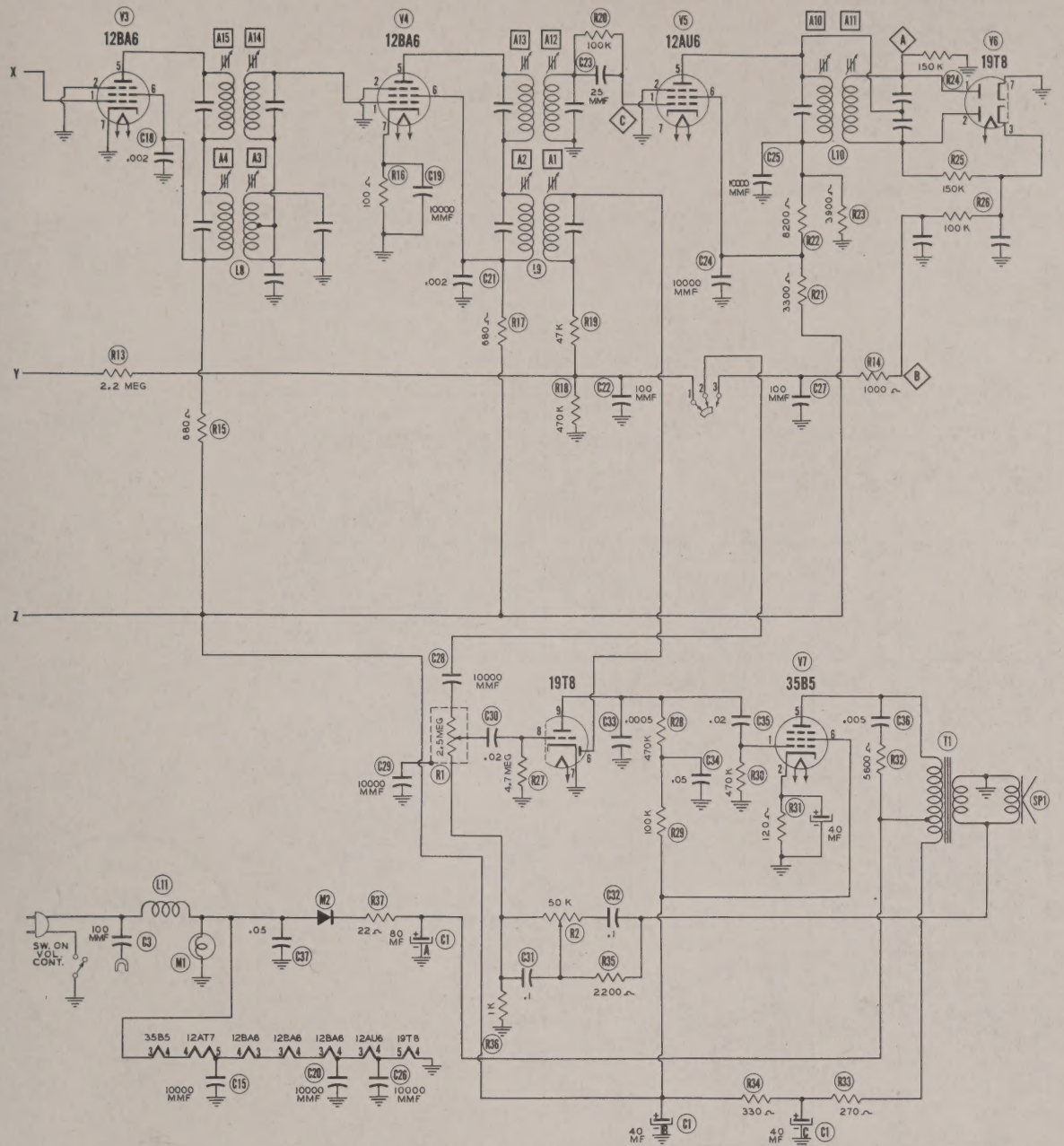

IF= 455 KC AM

IF= 10.7 MC FM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.

AM ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.
To set pointer, turn tuning gang fully closed and set pointer to the last yellow mark painted on the left hand side of the speaker grille.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to pin 7 (Grid) of 12AT7 (V2). Low side to chassis.	455KC (400∿ Mod.)	AM (counter clock-wise)	Tuning gang fully closed	Across voice coil	A1,A2, A3,A4, A5,A6	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC (400∿ Mod.)	"	Set pointer to the yellow mark on the right side of speaker grille.	"	A7	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		Loop	1400KC	"	Tune for maximum output.	"	A8,A9	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Isolate the VTVM by connecting a 2 Meg. resistor in series with the DC Probe.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (Grid) of 12AU6 (V5). Low side to chassis.	10.7MC (Unmod.)	FM (clock-wise)	Tuning gang fully closed	DC Probe thru 2 Meg. to Point (A) Common to chassis.	A10	Adjust for maximum deflection.
5.	.05MFD	"	"	"	"	DC Probe thru 2 Meg. to Point (B) Common to chassis.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	.05MFD	High side to pin 1 (Grid) of 12BA6 (V4). Low side to chassis.	"	"	"	DC Probe thru 2 Meg. to Point (C) Common to chassis.	A12, A13	Adjust for maximum deflection.
7.	.05MFD	High side to pin 1 (Grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A14, A15	"
8.	.05MFD	High side to pin 7 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A16, A17	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.
Isolate the vertical input of the scope, by connecting a 2 Meg resistor in series with the vertical amplifier input lead.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (Grid) of 12BA6 (V4). Low side to chassis.	10.7MC (450KC Sweep)	FM (clock-wise)	Point of non-interference.	Vert.Amp. thru 2 Meg. to Point (C) Low side to chassis.	A12, A13	Adjust for maximum amplitude and symmetry as per Fig 1.
5.	.05MFD	High side to pin 1 (Grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A14, A15	"
6.	.05MFD	High side to pin 7 (Grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A16, A17	"
7.	.05MFD	"	"	"	"	Vert.Amp. thru 2 Meg. to Point (B) Low side to chassis.	A11, A10	Adjust A11 so 10.7MC occurs at center of cross over lines as per Fig 2. Adjust A10 for maximum amplitude and straightness of crossover lines. Continue with step 9.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω carbon res.	High side thru 270Ω to "F" terminal on back of loop. Low side to "G".	98MC (Unmod.)	FM	Set pointer to the large yellow mark at top of speaker grille.	DC Probe to Point (C) Common to chassis.	A18, A19, A20	Adjust for maximum deflection.

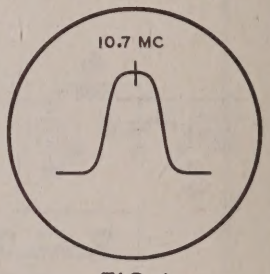

FIG. 1

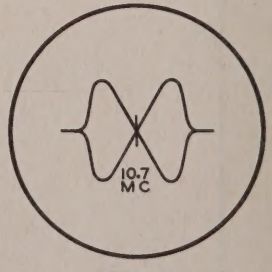

FIG. 2